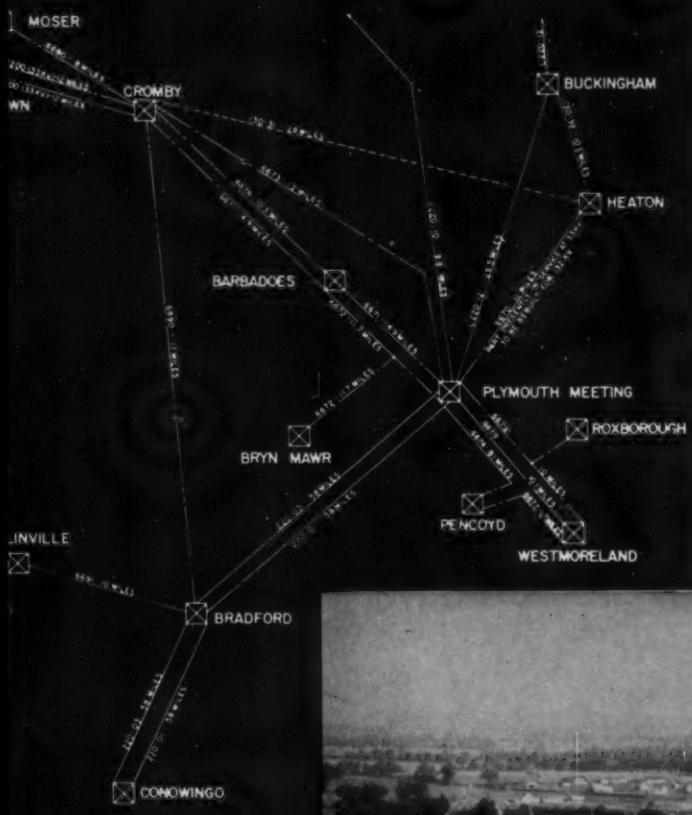
The Electrical Industry's Weekly Magazine

July 8, 1957

Electrical World

From 68 Cents

A McGraw-Hill Publication



HELICOPTER PATROLS 440 LINE-MILES ECONOMICALLY

...PAGE 82

Walter Barrett Views New AIEE Policy... p 62

E B POWER GS W 12
UNIVERSITY MICROFILMS IN
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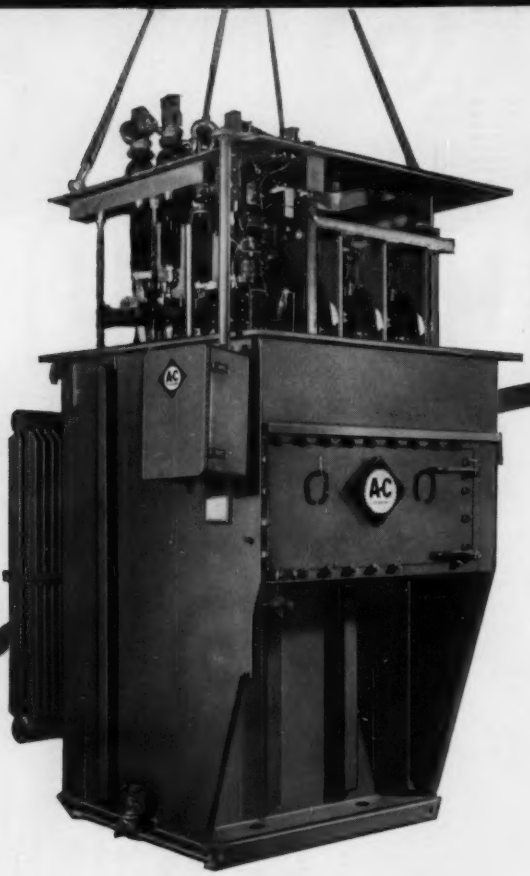
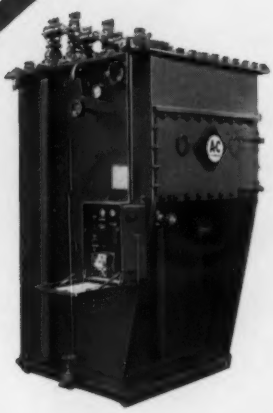
ANN ARBOR MICH



reasons for remarkable service of ALLIS-CHALMERS 3-phase regulators

unit construction



Exclusive unit-type construction, with transformer and tap-changing mechanism mounted to the cover, offers these important advantages.

- Continuous leads pass directly from transformer coils to double-bolt terminals on dial switch to eliminate 78 electrical connections.
- Tap leads from winding are brazed to bus bars to give greater short-circuit strength.
- Double bolts secure bus bars to dial switch terminals. Vibrations will not loosen connections.
- All connections are made before unit is tanked, providing extra assurance of good workmanship.
- Accessibility of parts prior to tanking the unit allows precise inspections to be made.
- Untanking is easy — remove cover bolts and control compartment nuts and lift unit from tank.

These are only a few of the many outstanding features of Allis-Chalmers 3-phase regulators. For complete specifications call your nearby A-C office, or write Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wis.

A-5460

ALLIS-CHALMERS

Electrical World

Vol. 148, No. 2 July 8, 1957

Published for 83 years for those engaged in the business of generating, transmitting, distributing, or applying electric power

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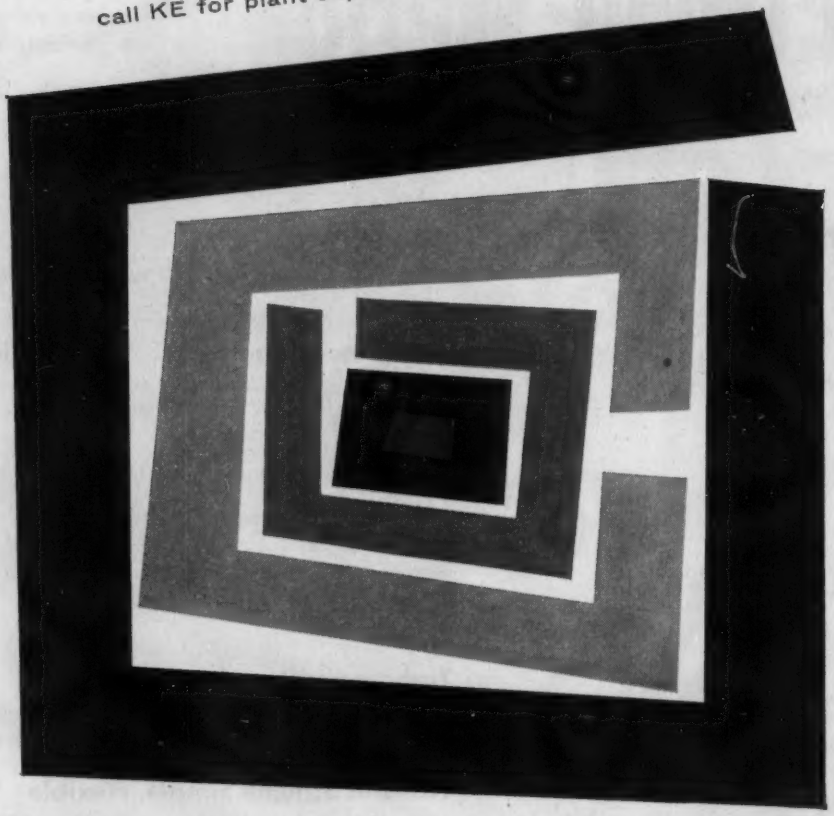
call KE for plant expansion or new facilities



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Engineering Test Reactor, National Reactor Testing Station, Idaho. Designed and built by KE—on schedule and within estimate!

The Engineering Test Reactor, Food Irradiation Reactor, Hanford Production Reactors, Aircraft Nuclear Propulsion Testing Facilities—these represent some of the nuclear energy projects performed by Kaiser Engineers. In each case, KE ingenuity produced efficient, lower cost facilities.

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. . . from the publisher

In running a publication that has been in business as long as Electrical World (83 years) you can sometimes have a tough time keeping up with the past.

Many times veteran EW subscribers tell us things about the magazine we ourselves don't know. For instance, last year came a request for some of Nikola Tesla's papers which the reader claimed had first been published in Electrical World. Sure enough, a check through our microfilm records turned them up.

Then last week from Chief Engineer J. B. Eldridge at Atlantic Sugar Refineries, Ltd in St. John, N. B. came a well-preserved two-page EW bulletin published back in 1919. It turned out the printers were on strike at the time, so the editors turned out a mimeographed bulletin service as a temporary substitute. Some sample stories:

• "Blue Ridge Power Co has nearly completed a 5,000 kw station near Hendersonville, N. C. Energy will be transmitted at 44,000 v for a distance of 38 miles.

• "Along the Atlantic coast, stocks of silk cord and pull chain sockets are low and hard to fill."

Such was the stuff that made news 38 years ago. For what's happening now turn to the Electrical Week on page 22.

Fischer Black

ELECTRICAL WORLD

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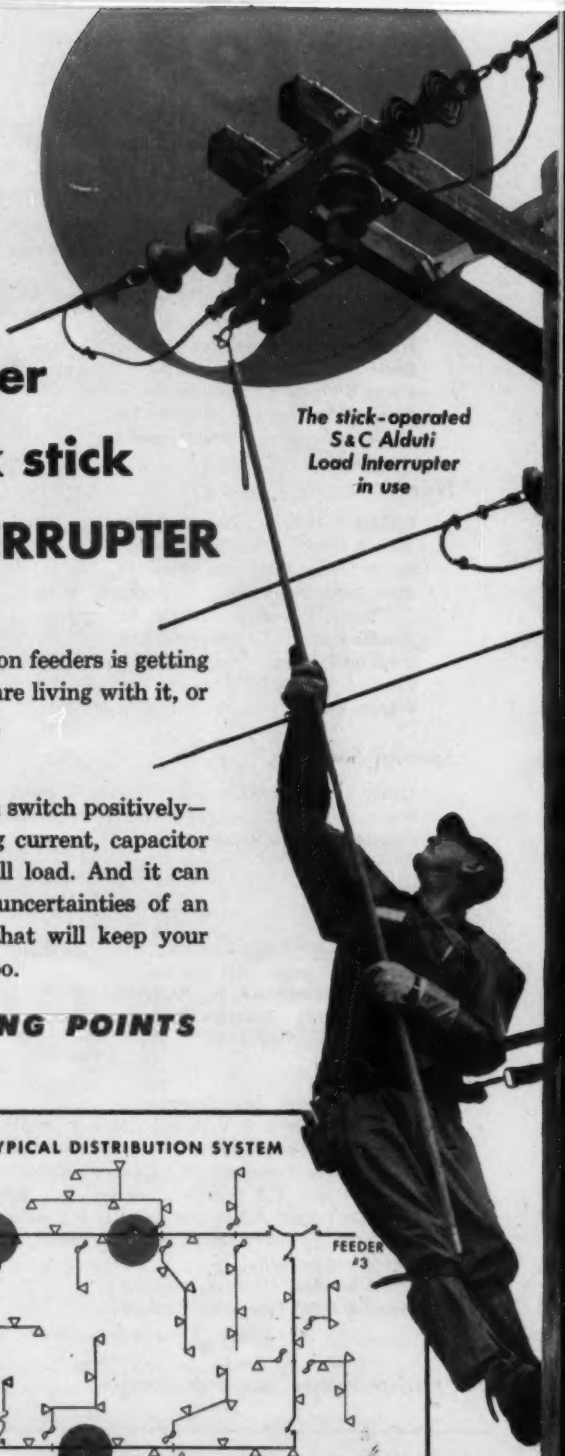
he can switch your 12 kv feeders anywhere, any time, under any load with a hook stick using an S&C LOAD INTERRUPTER



The stick-operated S&C Alduti Load Interrupter in use

Sure! The switching of your 12 kv distribution feeders is getting tougher and tougher! Maybe your linemen are living with it, or maybe you are spending a fortune just to get by.

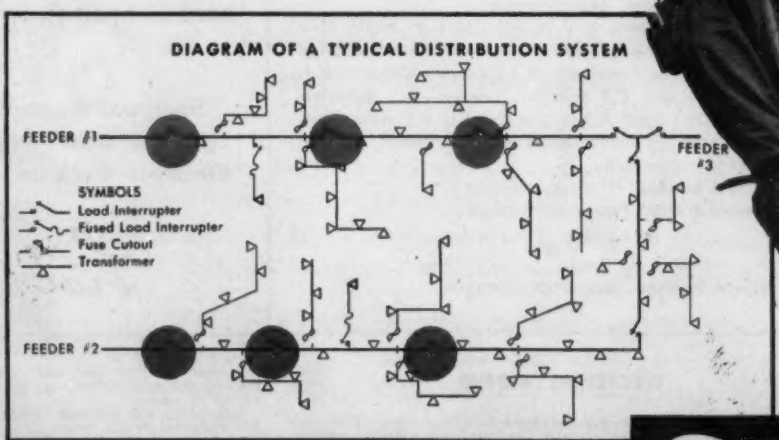
Is there another alternative?

Certainly! A stick-operated S&C Load Interrupter. It can switch positively—under any condition—any load, whether it's line charging current, capacitor charging current, magnetizing current, or full load. And it can be done without the hazards and uncertainties of an external arc. Here's a switch that will keep your linemen happy, and the comptroller, too.

USE IT AT SECTIONALIZING POINTS

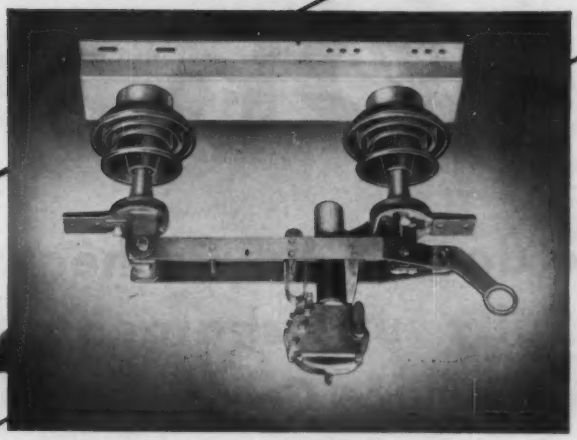
On 12 kv *radial* circuits, increased loads have made switching at sectionalizing points virtually impossible with conventional disconnects. On *loop* circuits (right) it's difficult enough where the duty involves only switching in parallel. And if the tie switches are open, hazard-free circuit interruption can be an impossibility.

Here, S&C Load Interrupters will give you safe, positive, circuit interruption on full line voltage and full load current—an advantage under emergency conditions, and a convenience under normal circumstances.



Specialists in High-Voltage Circuit Interruption since 1910

S&C



The S&C Load Interrupter, Alduti type; outdoor, single pole, (stick-operated); 14.4 kv, 600 amp. Three-pole, group-operated load interrupters are also available.

Load Interrupter Performance Comparison

PERFORMANCE	S&C Load Interrupters		Conventional Disconnects	
	Stick-Operated	Group-Operated	Stick-Operated	Group-Operated
Interrupt current from parallel sources safely?	YES	YES	DOUBTFUL	DOUBTFUL
Safe to equipment or personnel if inadvertently opened on full voltage (in case loop is open)?	YES	YES	NO	DOUBTFUL
Dump load without opening feeder breaker, or without preliminary unloading?	YES	YES	NO	DOUBTFUL
Multi-pole device controllable from ground (may be required by system practice or other circuits on same pole)?	NO	YES	NO	YES
Interrupt line charging current safely?	YES	YES	NO	DOUBTFUL
Cost?	LOW	HIGHEST	LOWEST	HIGH

The S&C Load Interrupter can switch the circuit without unloading preliminaries and without opening the breakers. The use of S&C Load Interrupters cannot lead to dangerous phase-to-phase or phase-to-ground faults, because there is NO EXTERNAL ARC. Also there is no danger to men or equipment in case of inadvertent operation. The S&C Load Interrupter breaks all load and charging currents instantly and decisively. Besides, you can mount it in any desired position —vertical, upright, or inverted. Write today for Catalog Section 760 on S&C Load Interrupters.

LOAD INTERRUPTERS

S&C ELECTRIC COMPANY

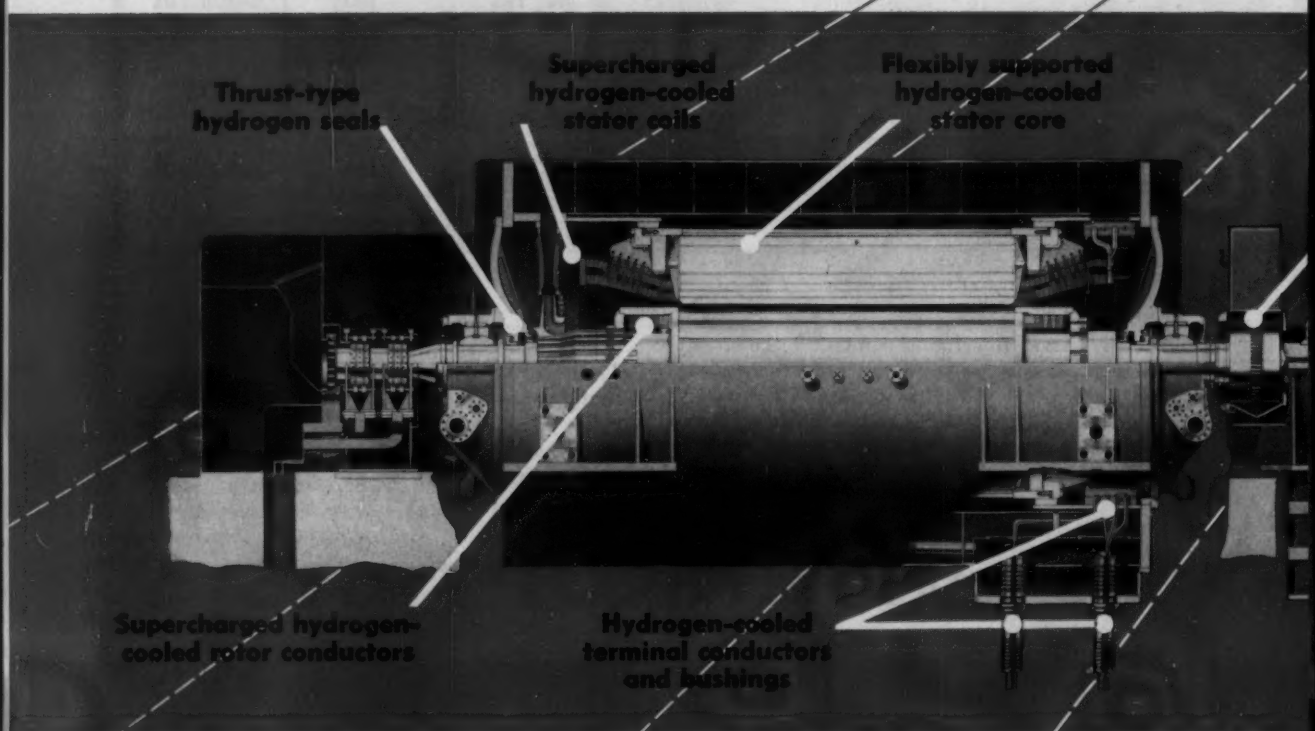
On the

. . . 150-mw double-flow reheat steam turbines with fully supercharged generators for Public Service Company of Indiana

THESE tandem-compound turbines with 26-inch exhaust blades embody such advanced design features as side crossunders that do not have to be removed during inspection; new underslung, side-mounted, two-speed turning gear; solidly bolted-down front control pedestal; and below-floor primary and reheat steam valves.

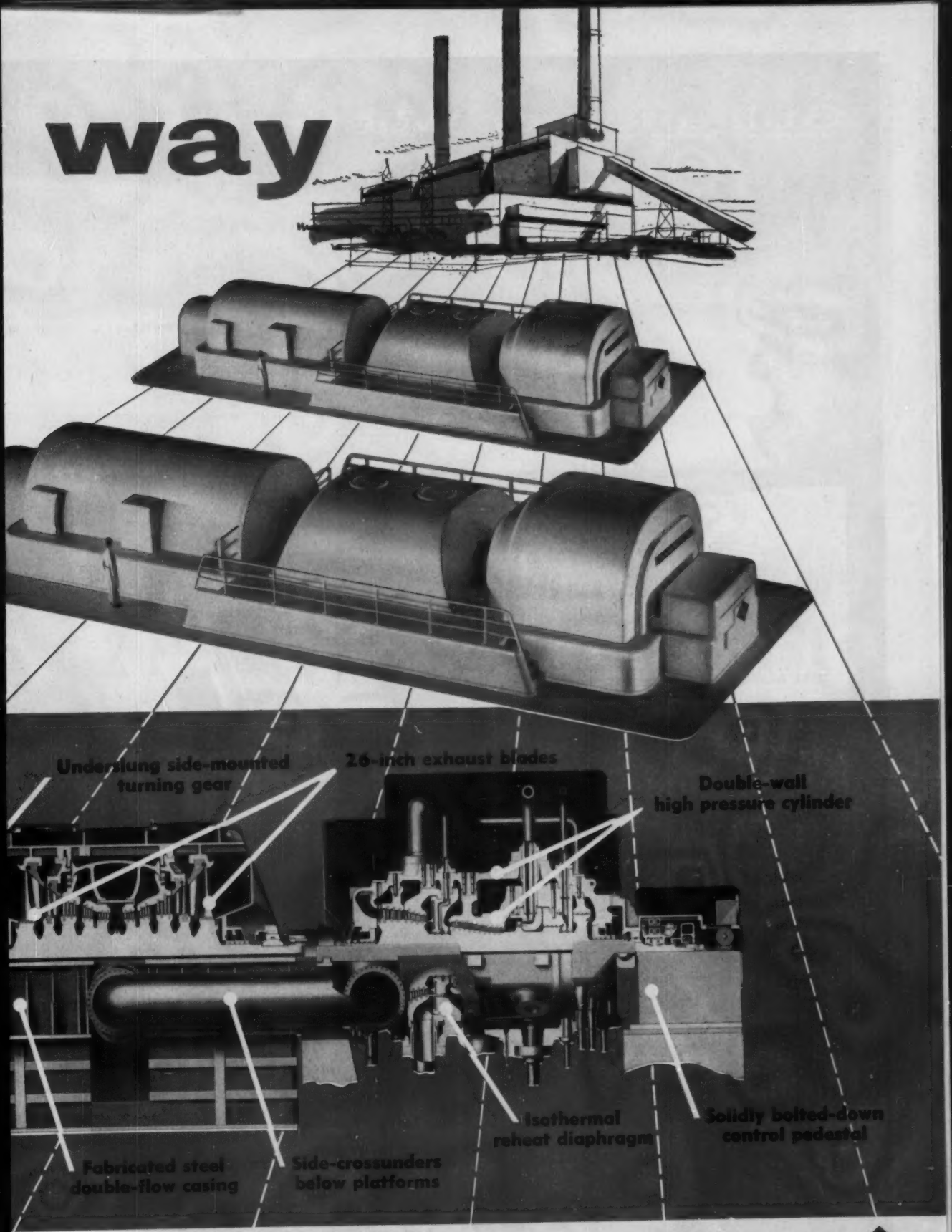
In the fully supercharged generators, high velocity hydrogen efficiently cools rotor copper, stator coils, core, terminal conductors, and bushings — applying fully the advantages of Allis-Chalmers pioneering in supercharged cooling.

Advances in design of double and triple-flow tandem ratings to 250 mw, and of 3600/3600 rpm and 3600/1800 rpm close-coupled cross-compound arrangements to 500 mw and larger, are discussed in publication 03R8620. Write your nearby A-C office or Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wisconsin.


Thrust-type hydrogen seals
Supercharged hydrogen-cooled stator coils
Flexibly supported hydrogen-cooled stator core
Supercharged hydrogen-cooled rotor conductors
Hydrogen-cooled terminal conductors and bushings

Units for New Albany Station of Public Service Company of Indiana. Turbine steam conditions: 1800 psig, 1000/1000 F, 1.5 in. Hg abs exhaust. Generators: 176,470 kva, 0.85 pf, 18,000 volts, 0.64 SCR at 45 psig hydrogen pressure. Consulting engineers: Sargent and Lundy.

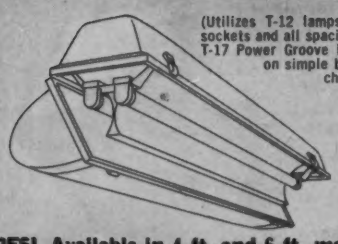
way



ALLIS-CHALMERS

A-5304

Still another Westinghouse



(Utilizes T-12 lamps. Has sockets and all spacing for T-17 Power Groove lamps, on simple ballast change.)

2FSL Available in 4-ft. and 6-ft. models

1. Fiber-Glass Housing contains ballast — is impervious to impact, corrosion! Never needs painting! 2. Acrylic Plastic Globe is unaffected by weather, never discolors, warps or cracks! Improved gasket is "sponge" foam Vinyl! 3. Reflectors are specially high-polished, finshed by famed Alzak Process — give maximum light output from the lamps employed! Open either way. Easiest installation! 4. Cast-Aluminum Slip-Fitter has 7° adjustment. Quickest leveling! 5. 2-Way Latch-and-Hinge Assembly opens either way. Fast maintenance! EVERY REFINEMENT REQUESTED BY FOREMOST LIGHTING ENGINEERS!

BETTER LIGHTING NOW
FOR SECONDARY STREETS...BY

5 MAJOR IMPROVEMENTS IN NEW 2-FSL FLUORESCENT LUMINAIRE!

Broader areas are bathed in natural, low-glare "high-visibility" light! All five specific refinements acclaimed by recognized Lighting Engineers!

All the outstanding success of today's modern lighting of primary streets—produced by the famous Westinghouse 4FSL (4-lamp) fluorescent luminaire—is now available for secondary business streets and important suburban thorofares!

Westinghouse has created a new, 2-lamp luminaire—the 2FSL—that capitalizes more completely than ever before on the use of tubular fluorescent light-source for street illumination.

This engineering of the 2FSL encompasses 5 distinct improvements. They are advancements providing unprecedented lighting efficiency, remarkably long service life, and speed and ease of application, installation and maintenance unparalleled in the past!

1. **Housing of Doubly Reinforced Fiber-Glass** is corrosion-free!—impervious to impact! *Cannot* dent! Permanent color is molded through. *No painting* is *ever* necessary! Wide flange creates ideal gasket seat and water shed!
2. **Globe of Acrylic Plastic** is light in weight but *extra* durable. Will not discolor, warp or crack. Is unaffected by weather, temperature or ultra-violet rays. Flanged edge "mates" with housing by specially seated "sponge" foam Vinyl gasket.
3. **Specular Aluminum Reflectors** are specially high-polished!—finished by the famed Alzak process! Deliver *maximum* light output from the lamps employed, with "ideal" light distribution! Assembly opens from either side for easiest access, simplified mounting and wiring to terminal block.
4. **Cast-Aluminum Slip-Fitter** accommodates 2" pipe, extending full 13" into housing, quickly secured by special clamp. Allows complete 7° adjustment — providing quick and easy leveling.
5. **New, 2-Way Latch-and-Hinge Assembly** simplifies maintenance. Permits globe to open either way. Stainless steel latches and springs (2 pair on 4-ft. unit, 3 pair on 6-ft. model) maintain *secure* gasket seal!

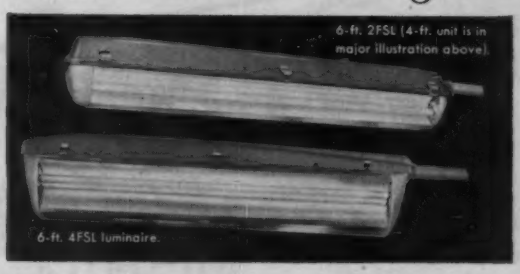
This new 2FSL luminaire incorporates every development proved superior by Westinghouse—acknowledged to be the nation's foremost authority on modern street-illumination.

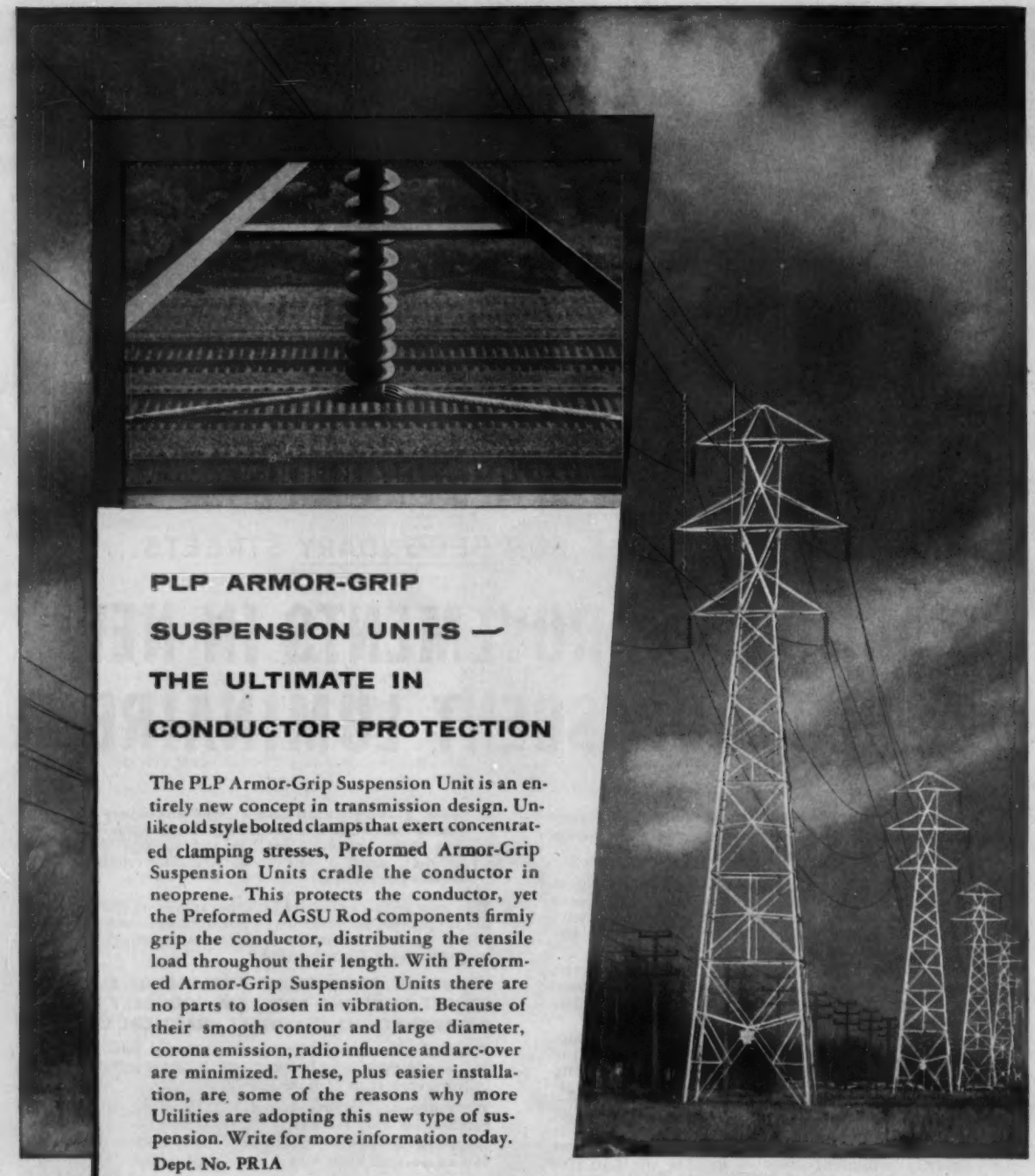
ACCURATE, FORTHRIGHT ANALYSIS OF EVERY STREET-LIGHTING PROBLEM. SOUNDEST RECOMMENDATIONS AT LOWEST PRACTICAL COST!

Westinghouse makes scientifically superior luminaires for *every type application!* — that most efficiently utilize *every type of light source!*

Westinghouse Lighting Specialists, therefore, *always* recommend *only the best possible system!* — for each specific street-lighting situation! — *consistent with the lowest possible costs that are practical today!* J-04411

YOU CAN BE SURE..IF IT'S Westinghouse





PLP ARMOR-GRIP SUSPENSION UNITS — THE ULTIMATE IN CONDUCTOR PROTECTION

The PLP Armor-Grip Suspension Unit is an entirely new concept in transmission design. Unlike old style bolted clamps that exert concentrated clamping stresses, Preformed Armor-Grip Suspension Units cradle the conductor in neoprene. This protects the conductor, yet the Preformed AGSU Rod components firmly grip the conductor, distributing the tensile load throughout their length. With Preformed Armor-Grip Suspension Units there are no parts to loosen in vibration. Because of their smooth contour and large diameter, corona emission, radio influence and arc-over are minimized. These, plus easier installation, are some of the reasons why more Utilities are adopting this new type of suspension. Write for more information today.

Dept. No. PR1A

PX-79

PLP Armor-Grip Suspension Units support these 132 KV Cleveland Electric Illuminating Company lines.

PREFORMED LINE PRODUCTS CO.

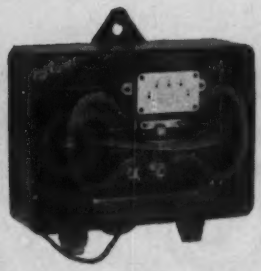
5349 ST. CLAIR AVENUE • CLEVELAND 3, OHIO

Telephone: Cleveland EXpress 1-3571

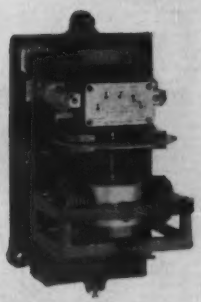
Made in accordance with or for use under one or more of the following U. S. Patents: 2,722,393; 2,275,019; 2,587,521; 2,609,653; 2,691,865; other patents pending

Do you have "MUSEUM" METERS on your system?

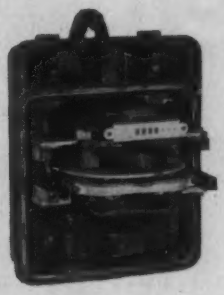
The meters shown are from Sangamo's Museum of Metering.



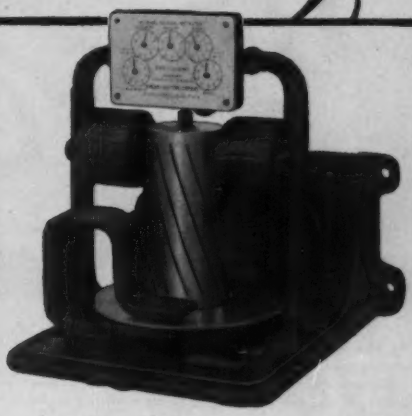
STANLEY A. C. WATTHOUR METER—1902. First meter to utilize principle of magnetic suspension. Sold for $10.00



THOMPSON A. C. WATTHOUR METER—1898. First induction type meter manufactured by Thompson which superseded his commutator type meter. Sold for $14.00



SHALLENBERGER A. C. WATTHOUR METER—1894. First commercial true energy measuring meter of the induction type. Sold for $15.00



GUTMANN A. C. WATTHOUR METER—1899. First A. C. Watthour meter manufactured by Sangamo Electric Company. First meter to utilize slotted armature to cause induced current to move sidewise. Sold for $11.25

More than 15,000,000 meters now in service are obsolete*

Surveys indicate that in addition to the millions of totally inadequate 5 amp. 2-wire meters still in service, there are another 11,000,000 meters of the "doubtful" category on utility company lines.

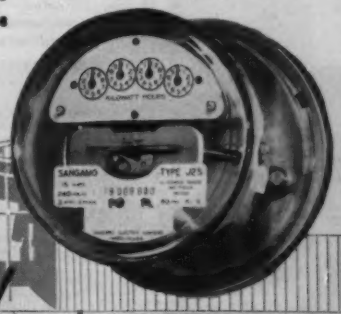
These "museum" meters are spinning at top speed in a hopeless effort to keep on measuring today's residential loads.

Carefully planned meter retirement programs are the wise answer to the problem. And the wise investment in replacement meters is the Sangamo J2—the watthour meter built to handle today's loads . . . *and* the loads of the future.

The Sangamo 15 ampere J2 meter incorporates the most advanced features of modern meter design to offer:

• *Straight line accuracy to 100 amperes* • *Corrosion-resistant construction* • *High torque, lifetime bearing system* • *High insulation level* • *Slow disc speed*

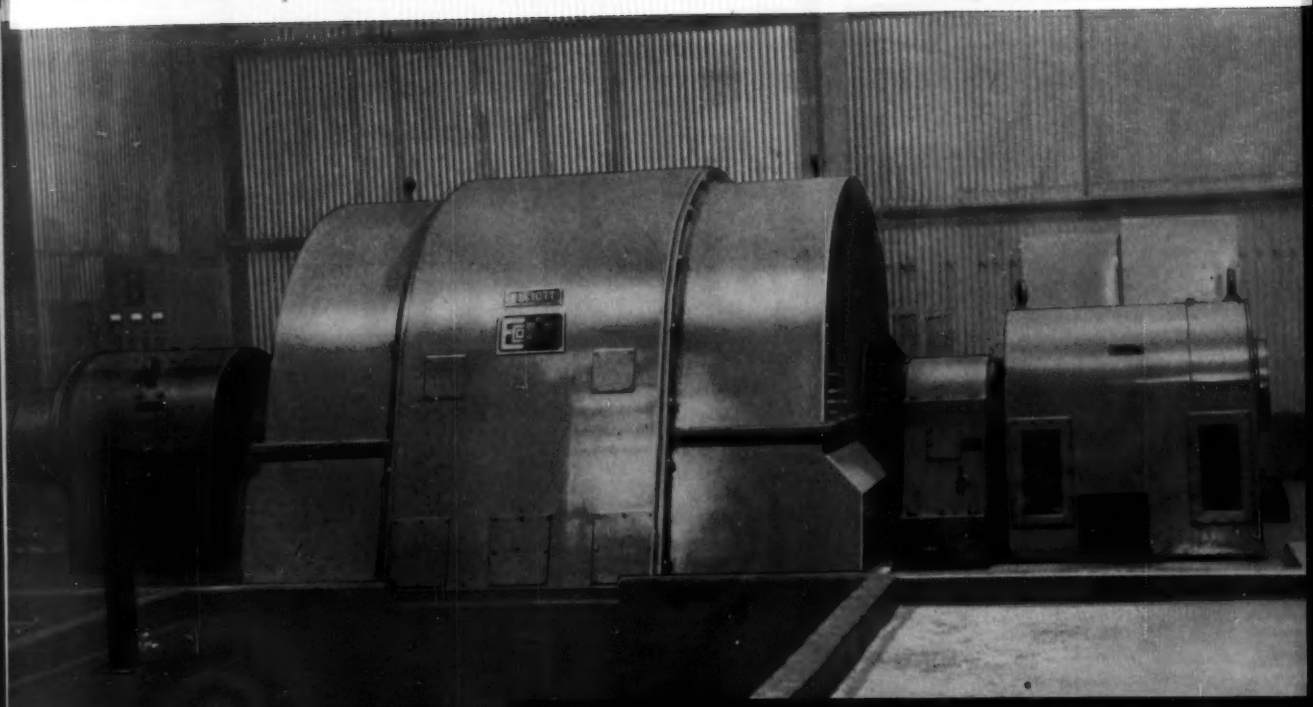
*These figures are based on surveys published in Electrical World. "LOADS OF THE FUTURE AND METERS OF THE PAST" has been reprinted for your convenience by Sangamo. Drop a postcard or a note for your copy of these surveys.



JH 57-4

SANGAMO ELECTRIC COMPANY

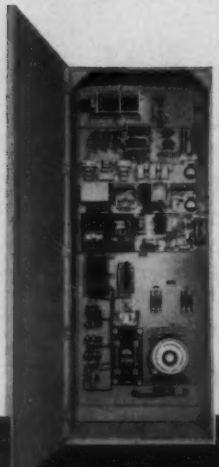
SPRINGFIELD, ILLINOIS



The above 20,000-kva, 900-rpm Elliott air-cooled synchronous condenser controls voltage flicker in a midwestern steel mill in connection with twin 60-ton electric arc furnaces. Direct-connected main and pilot exciters are self-cooled with filtered air inlets. A wound-rotor starting motor has a similar cooling system. The condenser is cooled by an air-to-water heat exchanger mounted in a pit beneath the floor.

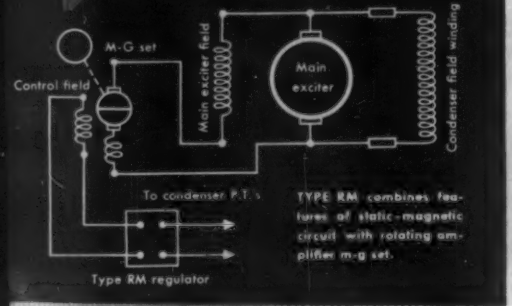
TWO MORE SYNCHRONOUS

controlling flicker voltages



An Elliott-engineered and built regulator control which insures full protection and instrumentation. This cubicle contains major static components of an Elliott excitation system.

Excitation systems furnished with Elliott synchronous condensers are specifically designed—electrically and mechanically—to individual installation requirements.

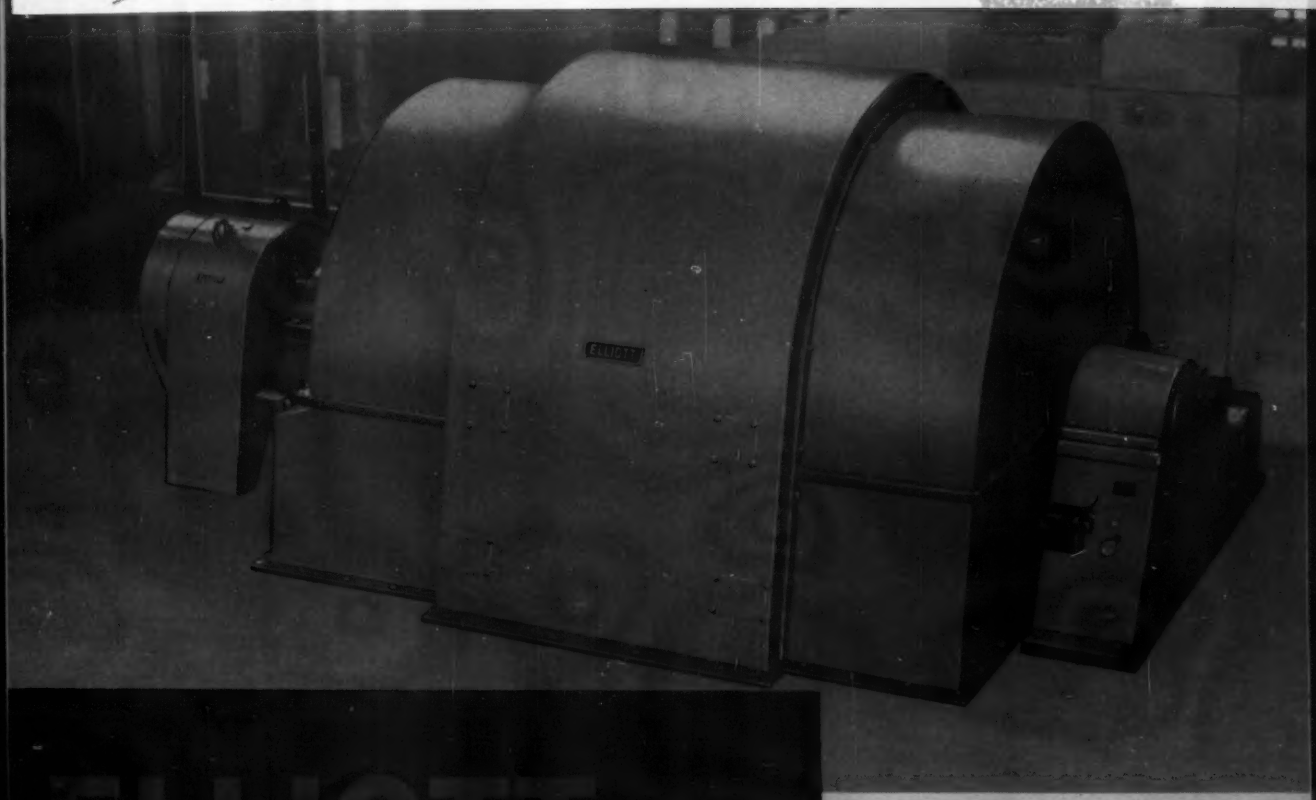


TYPE RM combines features of static-magnetic circuit with rotating amplifier m-g set.

Elliott Synchronous Condensers have established excellent records in electrical systems requiring power factor correction, automatic voltage regulation and improved system stability during faults. The units shown above are typical of successful installations all over the country, ranging from 20,000 to 50,000 kva, both air and hydrogen-cooled.

Each Elliott unit is individually tailored—electrically and mechanically—to the particular operating problem, whether it be lower-than-standard subtransient reactance, higher-than-standard excitation response, or special lagging kvar capacity performance.

In "normal" service, probably no other electrical machines are called upon to withstand such mechanical and thermal stresses as are synchronous condensers.



ELLIOTT CONDENSERS

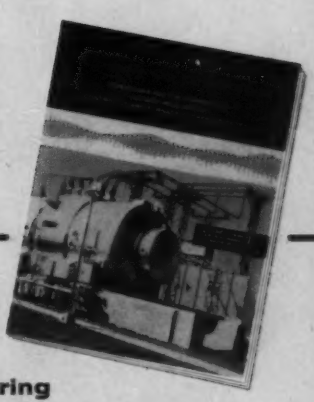
. . . in steel mills

Here a 30,000-kva, air-cooled Elliott synchronous condenser serves two furnaces and other mill loads in a prominent steel mill.

Elliott machines are specially designed and built to meet these severe requirements. Stator and rotor windings are heavily braced and supported to prevent destructive movement of the windings under stress.

Evidence of high-quality workmanship is seen in every detail of machine construction. In fact, the entire Elliott synchronous condenser is designed to simplify installation, inspection and maintenance.

For complete construction and application data, call your nearby Elliott District Office or write Elliott Company, Ridgway Division, Ridgway, Pennsylvania.



write for free engineering data

Write for Bulletin PB 5800, giving detailed information on the construction and application of Elliott synchronous condensers.

97-15

ELLIOTT Company

Type AM regulator.

UP

This Year More POLE STARS Are Being Installed Than in Any Previous Year

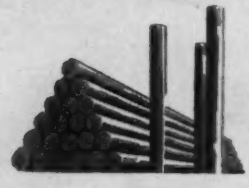
Steadily increasing sales of *any* product—month after month, year after year—must be based on a growing respect for that product. In the case of Pole Star Distribution Transformers, the tremendous growth in nationwide acceptance can be attributed to Pole Stars' reputation for economical, *sustained* performance in every type of distribution transformer installation.

The reason is *sound design*—built around Pennsylvania's patented lap-on-top core—plus precisely controlled production that results in "peas-in-a-pod" construction and quality in every Pole Star made. Pole Stars are available in all standard single-phase sizes from 3 through 500 kva, through 67,000 volts. Pennsylvania Transformer Division, McGraw-Edison Company, Canonsburg, Pa.

PENNSYLVANIA TRANSFORMERS pt

PENNSYLVANIA DISTRIBUTION TRANSFORMERS

"Lookee here, Babe," murmured Paul Bunyan admiringly, in a voice like distant thunder. Babe, the Blue Ox rolled an eye. "This here's a BAXCO cedar pole. * See how purty she is—straight, and round an' well manufactured. Babe, that there's a real POLE." The Great Logger smiled with pleasure. "Them Baxter folks shore knows their business."



BAXCO
WESTERN RED
CEDAR POLES

* Thanks, Paul. But we'd like to add that, besides being "purty," our cedar poles are supplied either full-length treated or butt-treated according to the most rigid specifications. Of course they didn't treat wood in your day, Paul, but for your information this low-cost preservative protection adds years and years of life to BAXCO Cedar poles. Besides, the Baxter people maintain large inventories at strategic points throughout the country and can offer their customers prompt shipments from adequate stocks. Immediate attention given to all inquiries.

©J. H. Baxter & Co. 1955

J. H. BAXTER & CO. *120 Montgomery Street, San Francisco 4, California*

NEW, SELF-FUSING, WEATHER-RESISTANT SPLICING TAPE

FOR RUBBER AND PLASTIC CABLES

OKOWELD—an entirely new tape designed for use on rubber or plastic insulated cables . . . provides *one-tape* splices and terminations for service up to 2000 volts . . . mechanically tough . . . resistant to weather and moisture . . . flame-resistant . . . easy to apply . . . available in five colors for color-coding of splices . . . made from a new, self-fusing compound developed by the Okonite Research Laboratories.

TYPICAL USES—For *one-tape* terminating and splicing of service drop cables . . . portable cords and cables . . . power and lighting circuits . . . control cables . . . bus bars . . . communication cables.

SPLICED-FOR-LIFE FEATURES

Self-fusing . . . . . forms solid moisture sealing wall
Abrasion-resistant . . . . approved by Underwriters' Laboratories
Compression-resistant . . . approved by Underwriters' Laboratories
Flame-resistant . . . . passes Bureau of Mines Flame-Resistance Test
Splice aging . . . . . properties improve with age
Shelf life . . . . . one year guarantee

ONE TAPE—MANY USES—Compatible with all cable insulations and sheaths . . . polyethylene . . . PVC . . . natural rubber . . . GRS . . . butyl . . . neoprene. Use for:

Insulation and sheath . . . . . up to 2000 volts
Sheath over insulation . . . . . over 2000 volts
Color coding . . . . available in Red, Blue, Green, Yellow and Black

STABLE IN SERVICE—Tested for more than two years in the laboratory, Okoweld shows excellent resistance to weather . . . ozone . . . chemicals . . . oils . . . hydrocarbons . . . moisture . . . mechanical damage.

EASY TO APPLY

Temperature range . . . . . handles well in hot or cold weather
Conformability . . . . . molds to irregular shapes
Cohesiveness . . . . . all surfaces bond permanently

U L APPROVED—Only self-fusing tape approved by Underwriters' Laboratories as "...the sole insulation and covering of joints and splices in electrical conductors."

Sold exclusively through Okonite's Authorized Tape Distributors

OKONITE splicing tapes

5202

FREE SAMPLE ROLL

It's yours if you'll just fill out this coupon and mail it to: The Okonite Company, Tape Dept., Passaic, New Jersey.

Name_____ Position_____

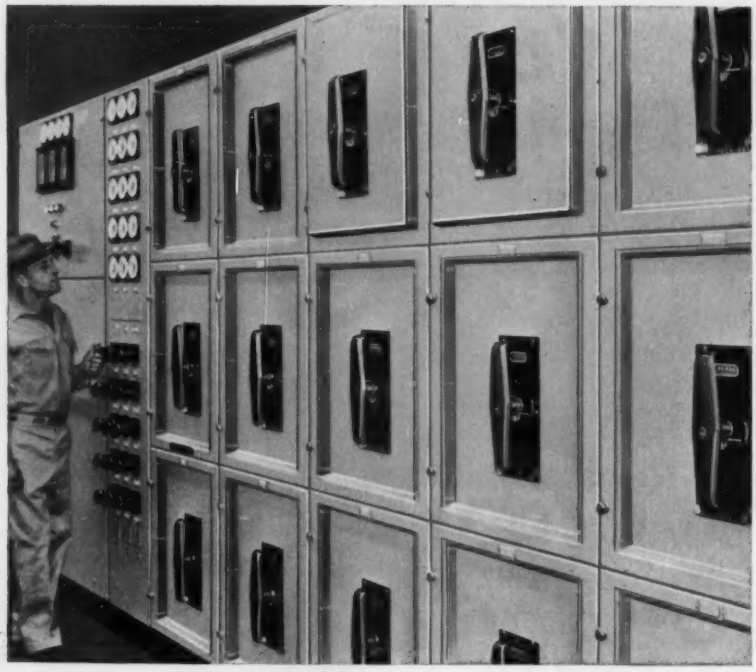
Company_____

Address_____

ALLIS-CHALMERS

low voltage

switchgear



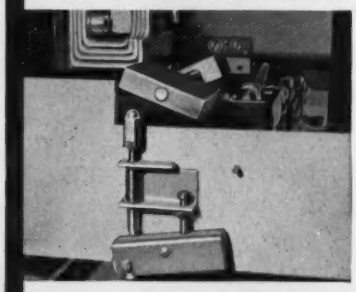
"Out in Front"

IN every way, this is outstanding switchgear. Whether it's the sleek-looking, two-tone outdoor gear with the inner service aisle . . . or the neat, compact indoor gear, you get the latest in features, design and construction.

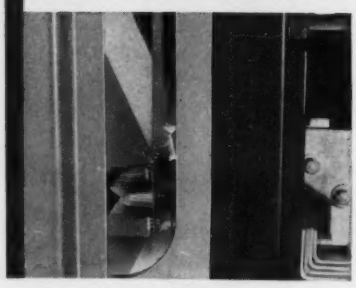
Check these features... then...

Get complete details. Call your nearby Allis-Chalmers office or write to Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wisconsin.

"Out in Front" with the contoured door panel that provides exclusive breaker storage inside cubicle.



Panel is shown in its reversed or protruding position to provide additional space in the closed cubicle when breaker is in test or disconnected position.



Safety first! Positive mechanical trip interlock automatically trips the breaker if anyone tries to move it in or out of the operating position while breaker is closed. Note also that breaker operation can be checked in test position with door closed or open.

Extra convenience. Movable primary and secondary disconnects are easily inspected through large cut-out on each side of breaker mounting frame. It's not necessary to remove breaker from mounting for this inspection.

A-5418

ALLIS-CHALMERS

NEWS-SCOPE

FUTURE NEWS ▶ **Growing prevalence of summer peaks** will cause many utilities not yet affected to study their generating capability in terms of summer demand and examine the capability of their distribution systems.

Rising cost of coal transportation may lead to more coal pipelines, use of gas turbines for peaking power, and greater interest in atomic power.

LATE NEWS ▶ **Hurricane Audrey, which took over 350 lives** in Southwest Louisiana, hit Gulf States Utilities hard. Four of GSU's five metropolitan areas were in storm's path and suffered extensive distribution damage from falling trees. Lake Charles area, near Cameron, got brunt of storm. Service was almost normal on Monday after. Quick volunteer aid came from Houston L&P, New Orleans PS, Louisiana P&L, Central P&L, and Southwestern G&E. GSU suffered two employee fatalities, expects repair costs to top $300,000.

Federal atomic liability insurance bill is passed by House. Measure, under which the government provides up to $500-million liability insurance on atomic projects, is now awaiting Senate action.

Idaho State Tax Commission urges Congress to reject the federal High Hells Canyon Dam bill, passed by the Senate. It told a House irrigation and reclamation subcommittee Idaho Power's project would provide over $1.8 million a year in property taxes plus additional large sums in income, excise, and kwhr sales taxes.

First service area agreement between a distribution cooperative and a power company is signed by Tri-County Electric Co-op and Otter Tail Power. Pact, designed to provide room for future growth of both firms, defines each supplier's service area and sets up guides for peaceful settlement of any possible future differences.

As of July 5, Westinghouse boosted by 5% prices on all land and marine steam turbine generator units, mechanical drive turbines and their accessories, renewal parts, and all heat transfer department products. All industrial gas turbine dept products rose 10%.

An issue of $15 million Rochester Gas & Electric Corp first mortgage 4⅞% bonds due 1987 was won by an underwriting group headed by Kidder, Peabody & Co, White, Weld & Co, and Shields & Co with a bid of 100.409%. These bonds are now being reoffered at 101.185% to yield 4.80% to the public.

Congratulations . . . Carl C. Ernst is elected president of California Electric Power to succeed Albert Cage, retiring . . . **Montana Power's** new senior vice presidents are T. L. Doran and C. J. Burns. Named as vice presidents were C. H. Kirk, W. W. German; L. S. Stadler; C. W. Raff, and H. C. Donaldson, also treasurer . . . **L. F. Hickernell** is named vp-engineering of Anaconda Wire & Cable, with full responsibility for directing both the engineering and the research and development activities of the firm.

ELECTRICAL WEEK

A TWO-MINUTE

AIEE MEETING ▶ **Changes in organization of American Institute of Electrical Engineers** will transfer some duties and responsibilities from the board of directors to the executive committee or department boards. That's the view of new AIEE President Walter J. Barrett. He doesn't anticipate any further organizational changes within the next year or two. Barrett doubts there will ever be a single, overall engineering organization. He thinks separate organizations carrying out specified functions are more flexible. Exclusive interview with the new AIEE president is on **page 62.** Full report on AIEE summer meeting next week.

EVENTS ▶ **Battlelines form on proposed generation plant in Indiana.** Hoosier Energy Cooperative, a G&T co-op venture by nine rural distribution co-ops, proposes to build a 198-Mw plant to serve its members and perhaps a large industrial load. Fuss is over whether the co-op should be allowed to finance plant with 2% federal money when private enterprise must pay considerably more **(p 66).**

SYSTEM ENGINEERING ▶ **Two years operation with automatic load-frequency control** equipment has convinced Northern States Power that it has many advantages over manual control of generation. NSP has set up area control of its own and nine interconnected systems by balancing area generation against area load. Also, by constantly monitoring frequency and adjusting generation, NSP can adhere closely to the economic loading schedule **(p 74).**

GENERATION ▶ **Two old 25-Mw turbine generators are being used as synchronous condensers** to generate reactive power for Cleveland Electric Illuminating's heavy-load downtown area. One generator is coupled with the turbine. The other is not. The uncoupled generator requires a heavy, forced-oil cooling system and is started by another generator in the plant. Use of the two 30-year-old generators saves an estimated $100,000 a year in fuel costs, writes CEI Engineers K. D. Buck and C. H. Didriksen in an article giving the details **(p 78).**

An occasional half, or quarter turn will prolong life of ash-removal piping. Also new alloy piping offers some promising savings **(p 90).**

One-man scaffold for use in boiler maintenance work is proving to be a handy, safe gadget at Indianapolis P&L. It's an adaption of the bosun's chair **(p 92).**

Backwash system for flushing cooling water pipes on boiler feed pumps is saving considerable maintenance expense at American G&E's Sporn Plant. Based on the experience with backwashing of the oil coolers for one boiler feed pump, it appeared that mechanical cleaning could be eliminated for all oil coolers at the plant. Accordingly, there is now a backwash system on the 24 coolers for all 12 pumps. They're estimated to eliminate 900 man-hr of maintenance work per year **(p 89).**

PREVIEW OF THIS WEEK'S ELECTRICAL WORLD

TRANSMISSION ▶ **Helicopter patrol of Philadelphia Electric's 440-mile transmission system cuts costs** and provides better inspection than the traditional ground patrol. Using helicopter service provided by a local flight firm, the utility makes its monthly patrol rounds for $1,200 compared with $1,400 for ground patrol. The service is also available for emergency patrol and ferrying of some materials to site of a breakdown. So far there have been no complaints from residents along the rights-of-way **(p 82).**

HEATING & COOLING ▶ **A 60% increase in heat pump installations** last year is attributed by Alabama Power Co to active promotion work underscored by long range aims. Company's attack on summer peak includes mutual assistance and promotion with heat pump dealers, distributors, and manufacturers. Other aids are regular meetings with "buying influence" people—architects, builders, and air conditioner makers—and a testimonial booklet **(p 98).**

SELLING ▶ **Precision tool and die work is increased by air conditioning** unit that holds tool and material temperatures between 68 and 70 F. Tolerances as close as ±0.0001 in. are machined on a jib borer with sensitive, optically regulated measurements. The 3-ton cooling unit tempers materials for 48 hr or more in advance **(p 104).**

MANAGEMENT ▶ **New thrift plan wins support** of 98.6% of Community Public Service Co employees. It enables personnel to accumulate funds in savings or securities as supplement to pension plan. Of those participating, 82.4% asked that all or part of their thrift funds be invested in company stock **(p 71).**

PEOPLE ▶ **Consolidated Edison Co of New York elects Otto W. Manz, Jr,** executive vice president; C. Wesley Meytrott is new vice president in charge of sales . . . At Interstate Power Co, Charles E. Strickland becomes a vice president and manager of Mason City, Iowa, district . . . Clyde Lilly is manager-marketing for GE's large steam turbine-generator dept . . . Federal Pacific Electric promotes Robert Bobo **(pp 128, 130).**

MANUFACTURERS ▶ **New two-stator meters of Sangamo Electric Co** will have standard connections and relative ratio of constants, EEI-AEIC meeting reveals. Pros and cons of a single wye-delta meter were discussed **(p 125).**

NEW EQUIPMENT ▶ **A residential secondary capacitor has rectangular design** permitting complete impregnation, which reduces possibility of internal failure. The unit can be mounted in any position on crossarms or poles. It has 240-v rating in 3, 5, and 7.5 kvr . . . Compact dust collector removes particles of 5 microns or over with 99% efficiency . . . Service truck body on cab-over-engine Jeep provides large carrying capacity with minimum wheelbase **(p 109).**

ENGINEERING TRENDS

The resistor in a high-resistance generator grounding system should be selected to limit resistor losses to a value equal to or slightly more than the capacitative kvars which exist with a ground fault on one machine terminal.

High power density and fuel burnup sought in power reactors for production economy hinge on improving the dimensional stability of fuel elements under irradiation and thermal stresses, bolstering resistance to corrosion, and accommodating the fission products. Uranium oxide, metallic uranium, and some uranium alloys are little affected structurally by irradiation. But the volatile fission products, primarily xenon and krypton, tend to be entrapped in metallic uranium-bearing fuels to cause swelling at high temperatures. No distortion has been observed in the inherently brittle UO_2.

Iron powder burned with oxygen cut cast iron case of a 21,000-hp Pelton turbine rapidly and economically in an Australian hydroelectric plant to speed modifications of older units for higher efficiency in peaking service.

Reports can be flashed to headquarters at 1,000 words per min with a new system which codes data on a magnetic tape for automatic transmission to a magnetic receiver during idle periods on a voice channel. Information thus flashed would be decoded automatically to an electric typewriter for headquarters use.

Reduced voltage at under 60 cps exists on stator windings during rotor preheating periods. Adequate relay protection should be provided to detect any fault that might occur in the unit at such subnormal frequencies.

Salt-water-resistant aluminum alloy armors St. Lawrence cable instead of customary steel. Objectives were savings in weight and magnetic losses as well as better electrical characteristics in this long submarine crossing which cost $1 million less than circuitous tower lines in bad icing area.

Recruiting engineers in Europe will not solve America's needs. One nation has already restricted newspaper advertising for engineers to go abroad. And even in the U. S., where efforts to lure engineers from established centers to manswelling organizations elsewhere have become big business, recruiters are reported to be encountering stiffer opposition.

Concrete poured in freezing weather must be protected from frost during its initial setting period to avoid disastrous failures. High among recommended precautions are avoiding frozen subgrades and diverting chilling winds.

Q. what's he designing . . . insulators or hardware?

A. it may be either one . . . he designs both.

In the O-B engineering department, designs for insulators and hardware often come from the same drawing board.

An engineer in charge of developing transmission and distribution materials may work on a clamp one day, and on an insulator the next day.

It's significant that he works on both. And it's logical. Insulators and hardware work together in service. Why shouldn't they be designed by the same person?

Thus single responsibility begins even before the products are made. It carries through designing, manufacturing, testing . . . and, most important, performance in service.

We're concerned with how good is the hardware, and how good is the insulation. But our main concern is with how good they will work together.

The one company that designs and makes both insulators and hardware is Ohio Brass.

4746-H

Ohio Brass

MANSFIELD OHIO, U.S.A.

Electronic Route to Lower

M. W. Kellogg's Digital Computer Permits More, Faster, Accurate Flexibility Analysis of Complex Main and Reheat Piping Systems

Control section of Kellogg's electronic computer.

KEEPING PACE with the increasingly critical pressures and temperatures of the modern steam-electric power plant are M. W. Kellogg's advanced techniques for pre-determining stresses and reactions of main and reheat piping. Most recent addition is a large magnetic drum digital computer, used to calculate forces, moments, deflections, rotations, and stresses in complex piping systems.

By enabling Kellogg engineers to undertake a far greater number of calculations in less time than ever before, electronic computation makes possible the ultimate or near ultimate piping system designs. Pipe runs can often be shortened without sacrificing required margins of safety; capital investment and maintenance costs reduced; operating efficiency increased.

A pioneer in flexibility analysis techniques, which include manual calculations, model testing, and a smaller electronic computer, Kellogg continues its pioneering in the power piping industry by the addition of this high speed computer to its New York engineering facilities.

A cordial invitation to see the M. W. Kellogg electronic computer at work is extended to consulting engineers and to engineers of power generating companies and their equipment manufacturers. Appointments may be made through the Sales Manager, Fabricated Products Division.

FABRICATED PRODUCTS DIVISION

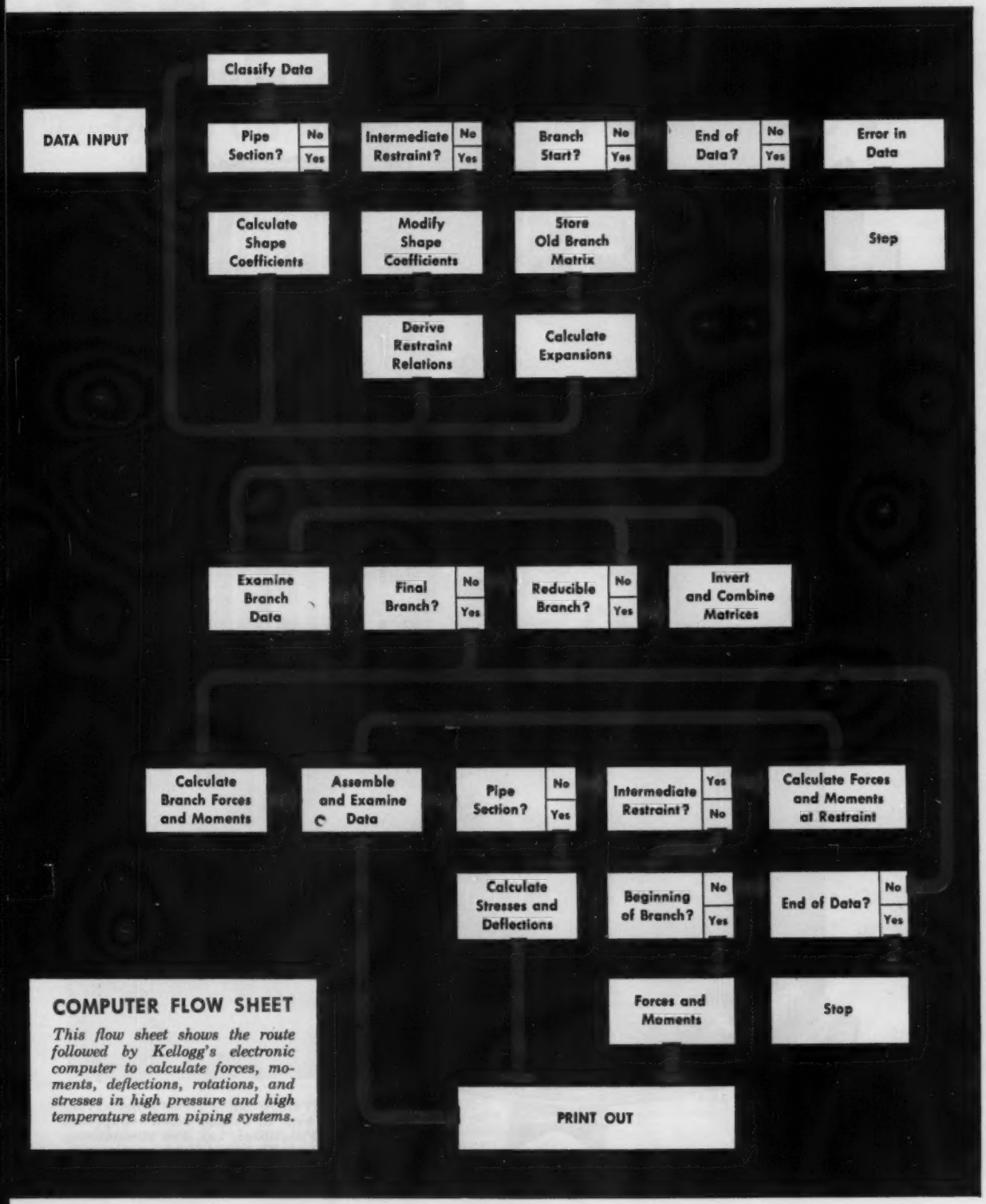
THE M. W. KELLOGG COMPANY, 711 THIRD AVENUE, NEW YORK 17, N. Y.

A SUBSIDIARY OF PULLMAN INCORPORATED

The Canadian Kellogg Company Limited, Toronto • Kellogg International Corporation, London • Societe Kellogg, Paris
Kellogg Pan American Corporation, New York • Companhia Kellogg Brasileira, Rio de Janeiro • Compania Kellogg de Venezuela, Caracas

POWER PIPING—THE VITAL LINK

Steam Power Piping Costs



COMPUTER FLOW SHEET

This flow sheet shows the route followed by Kellogg's electronic computer to calculate forces, moments, deflections, rotations, and stresses in high pressure and high temperature steam piping systems.

THE MOST MODERN DESIGN

This Type LD single-phase transformer—available 250-500 kva, 15 kv and below—improves appearance. Functional, too, this streamlining eliminates external hardware and bracing, aids cleaning and routine maintenance, retards corrosion. Cooling oil is reduced by 35%, transformer weight 27%.

IN SUBSTATION TRANSFORMERS...

NEW

tank, coolers, core, coils; installation area reduced up to 37%, weight cut up to 27%

The latest development in substation distribution, the Westinghouse Type LD transformer, is completely new . . . new base, new bushings, new coolers, new core-and-coil assembly, new tank with exclusive sealing weld at bottom. These features make possible new economies, savings in installation space, maintenance, and inspection.

Longer service life—Low ground capacitance gives more evenly distributed surge voltages—means extra resistance to voltage breakdown. Liberal cooling ducts prevent possibility of hot spots and associated insulation failure. Result—longer coil life.

Smaller, lighter—By preventing abnormally high-voltage stress during surges, Lowgrocap* makes excessively heavy insulation on the coil end turns unnecessary, resulting in smaller, lighter coils. D-shaped cross section of magnetically superior Hipersil® core permits maximum utilization of tank space. Special configuration of wooden end frames with tie rods placed next to core keeps all non-insulating materials away from coil—results in assembly of basically higher insulation strength, and facilitates bringing out both H. V. and L. V. leads.

*Trade-Mark

Less installation area required—Flat, fin-type coolers, more efficient than round tubes, allow placing all cooling on one side only, away from L. V. bushings and cables. Following, are the typical reductions in physical dimensions made possible.

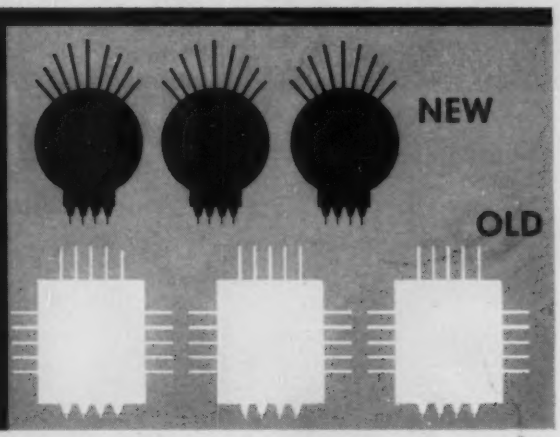
KVA	WIDTH AND BASE AREA REDUCED		HEIGHT REDUCED		WEIGHT REDUCED	
	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.
250	15%	21%	10%	17%	23%	27%
333	15%	25%	8%	14%	22%	26%
500	15%	37%	1%	12%	18%	21%

Ease of inspection, maintenance—This modern design with tank weld at bottom permits easier, more complete inspection. Eliminating necessity of disturbing core and coils in simplified untanking procedure minimizes possibility of damage and contamination.

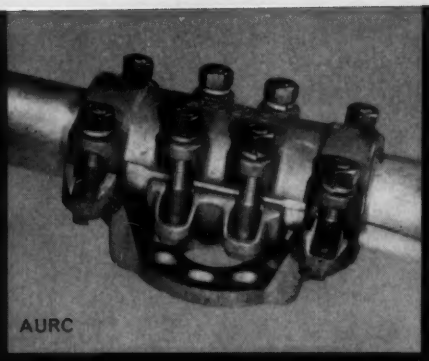
For further information about the new type LD transformer, call your Westinghouse representative . . . or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-70817

YOU CAN BE SURE...IF IT'S Westinghouse

New D core with Lowgrocap winding provides compact unit assembly. The outer layer of paper insulating tape on each individual strand of H. V. copper is impregnated with a thermosetting plastic, as is the glass tape banding the coils together. When heated, this bonds the coils into a unit of extraordinary strength. Also clogged cooling ducts are prevented since no varnish treatment is necessary.



Width of Type LD is up to 37% less than superseded ratings of Type SL transformer—an important cost and spacesaving reduction.



AURC

ATT2C

ATCC

ASTT

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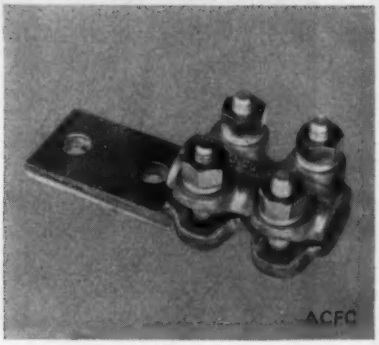


ACFC

Today, substations are demanding aluminum bus and connectors for greater economy. For 30 years Anderson Electric has pioneered research with aluminum. Our production is complete from ingot to finished product. Our quality control methods insure "high density" by eliminating "pin-hole gas porosity" in aluminum castings. Anderson, and only Anderson produces a complete line of substation connectors — for every job — in aluminum.

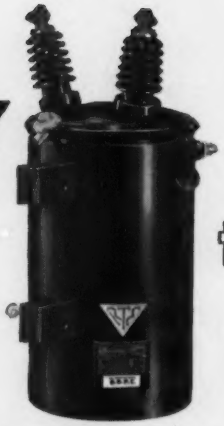
For full information and details about specific connectors, contact your nearest Anderson representative or write

ANDERSON ELECTRIC

ANDERSON ELECTRIC CORPORATION
Birmingham 1, Alabama.

Export Representative: International Standard Electric Corp.

Aluminum & Bronze Power Connectors • Clamps • Fittings • Accessories for SUBSTATION • TRANSMISSION • DISTRIBUTION



transformers

EASY TO INSTALL

Light, compact design makes handling easy.

- **Standard EEI-NEMA mounting brackets.** Upper bracket on tank has jump proof lug.
- **Both high and low voltage bushing terminals will accommodate either copper or aluminum conductor** in full range of sizes required by NEMA Standards.
- **Ground connector can be rotated** to provide three possible ground wire entrances.
- **Locked type secondary bushings** provide safe, speedy hookups.

EASY TO MAINTAIN

R T & E's new transformers are loaded with features to minimize maintenance.

- **Externally operated tap changer** eliminates entering tank; handle is marked for easy identification of tap position. Taps can be changed readily without disturbing transformer seals.
- **Terminal failures due to stress corrosion are minimized** by use of special aluminum bronze alloy terminals.
- **Band type cover clamp** and tank cover can be removed as a single unit.
- **Completely "Weather Protected" to resist corrosion** by three coats of baked on modified alkyd paint, arc welded seams, stainless steel band type cover clamp and stainless steel mounting pads.
- **Inhibited Oil—(D.B.P.C.) effectively increases transformer life** up to 15 times by reducing sludging.
- **Locked type secondary bushings** will not turn when line leads are attached thus maintaining tight gasket seal.

equipment to help provide power for America

R T & E CORPORATION
WAUKESHA, WISCONSIN

NEW! CLARK Type "AL" AUTOMATION CAM LIMIT SWITCH

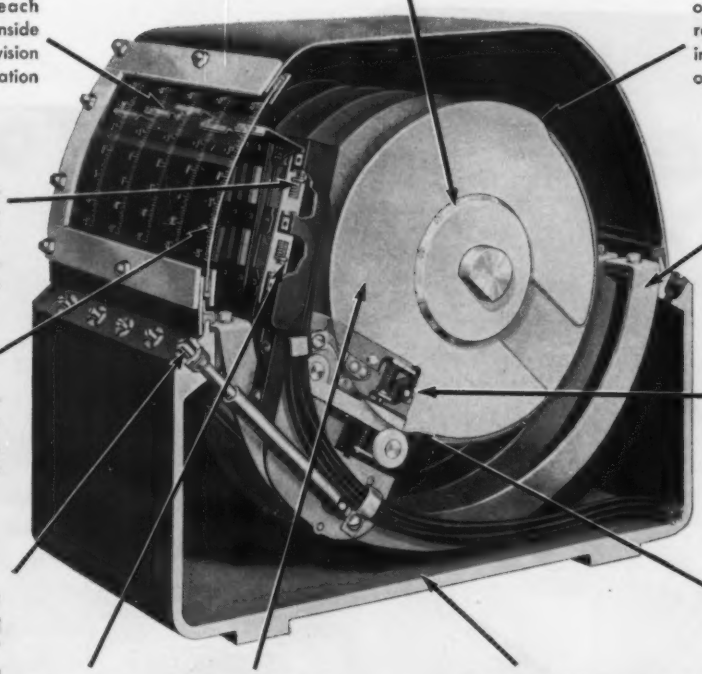
— ADJUSTABLE IN MOTION —

GREATER SAFETY! GREATER FLEXIBILITY! GREATER PRECISION! EASIER MAINTENANCE!

PRECISION—Cams can be loosened and reset without removing them from shaft. Graduations facilitate making precise settings.

PRECISION—Graduated scales for adjustment of each switch unit are printed on inside of clear plastic window. Provision is made for circuit identification visible through window.

SAFETY—Switch unit is actuated only when roller is riding on raised segment of cam. Jogging in reverse does not alter sequence of operations.



FLEXIBILITY—An additional isolated contact—easily convertible in the field—is available for each switch unit, to permit control of two circuits from a single unit.

FLEXIBILITY—Rear-mounted switch units can be added to permit micro-adjustment of both make and break of a single circuit operated by a single cam.

MAINTENANCE—All contacts clearly visible through plastic window. Inspection may be made without removing switch cover.

PRECISION—Snap-action, latching type switch units make possible smooth performance, being operated by constant acceleration cams eliminating "bumping".

PRECISION—Position of switch unit can be adjusted to micro-accuracy over a 30° range from outside housing *while machine is in motion.*

SAFETY—Cams force contacts open and hold them open—assuring postive break.

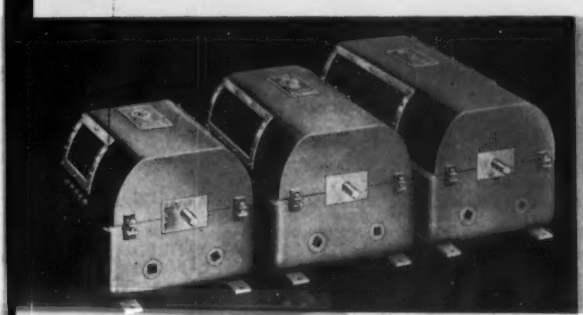
SAFETY
Heavy-duty 15 ampere industrial-control type contacts will not jar open with severe vibration.

PRECISION
Large (7-in.) twin-disc adjustable butterfly cams operate each circuit. Wide variety of cam equipment available to cover range of contact operations from 15° to 345°.

MAINTENANCE—Enclosure with cast aluminum base and welded steel cover meets NEMA 4 (watertight) and NEMA 12 (automotive and J.I.C.) standards. Oil resistant rubber gasketing and packing under pressure completely seal enclosure.

3 basic sizes: 5 cam, 9 cam and 12 cam. The 12-cam size can be modified to accommodate up to 16 cams. With double-sided switch arrangements, each size can provide additional switch units up to one less than the number of cams.

These new CLARK Type "AL" Cam Limit Switches meet the rugged requirements of large presses, and have broad application on many other machines where accurate and dependable sequence operation of multiple circuits is required. They are ideal for use where it is advantageous to make precision adjustments while machines are in motion, and are particularly suitable for many applications in the field of Automation.



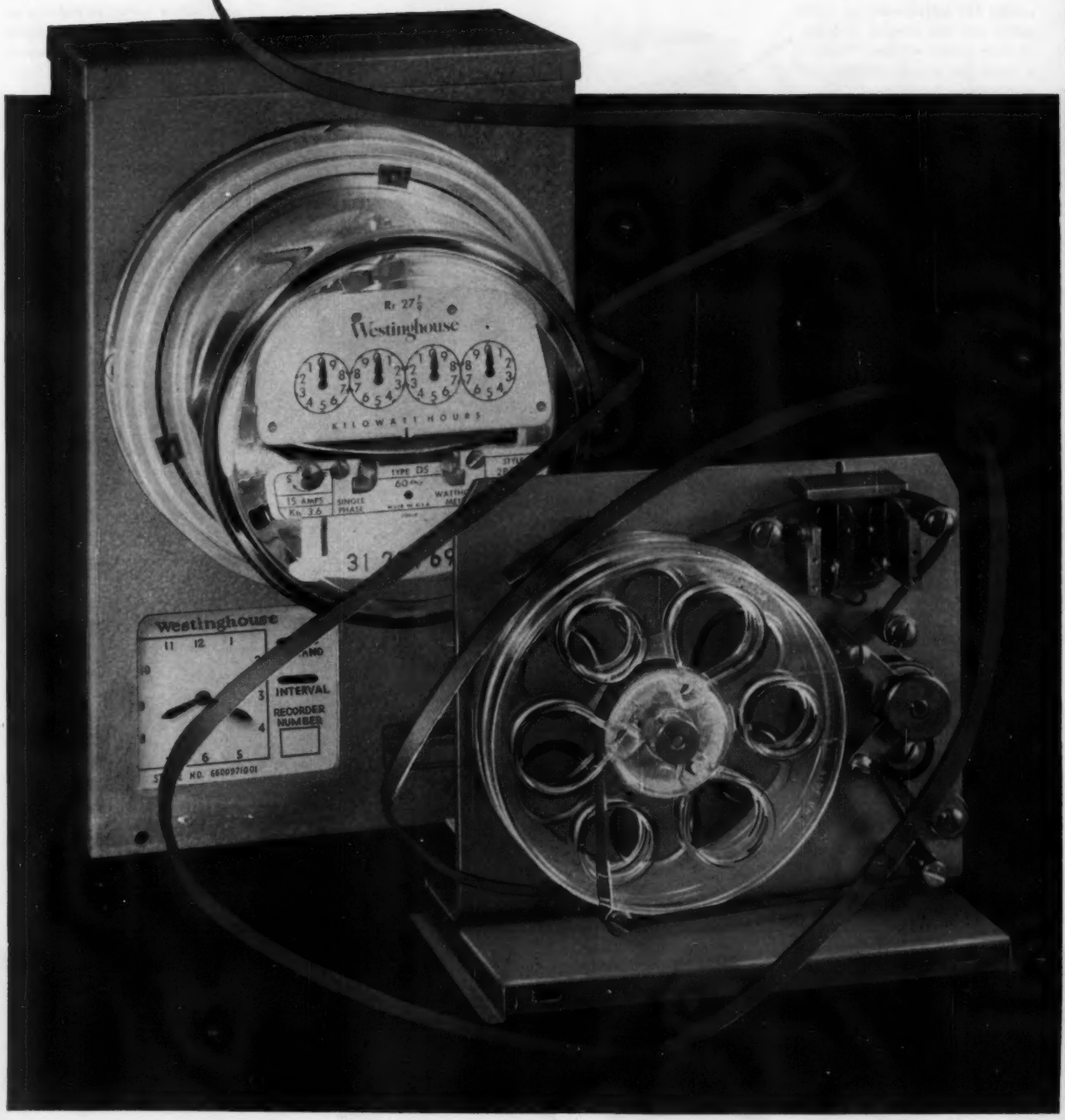
For more information, write for Bulletin 102-AL

The CLARK CONTROLLER Company

Everything Under Control • 1146 East 152nd Street • Cleveland 10, Ohio

IN CANADA: CANADIAN CONTROLLERS, LIMITED • MAIN OFFICES AND PLANT, TORONTO

"Red Tape"


Westinghouse
KILOWATT HOURS
TYPE DS
15 AMPS
SINGLE PHASE
Westinghouse
INTERVAL
RECORDER NUMBER

saves you money

Exactly! It's magnetic recording tape in the new Westinghouse Load Survey Meter

The new Westinghouse Load Survey Meter uses the principle of automation. It gets the same results . . . higher production from fewer man-hours.

Essentially, the meter is a tape recorder that translates consumer demand indicated by the watthour meter into "intelligence" on the tape—at the maximum rate of 240 demand impulses per interval. The 600-foot tape runs a full 32 days. The tape then is "played back" through a special translator in conjunction with an IBM 526 Printing Summary Punch. In 35 minutes the translator and card punch can deliver a record for the month on punched and printed IBM cards. No engineers, clerks or card-punch operators are involved.

Compare this operation with current methods which require two interpreters for each six recording charts per day—plus an IBM operator—just to read the record and put it in usable form.

The new Westinghouse Load Survey Meter is a truly practical tool. It saves you money in the process of giving you accurate information on which to plan more efficient generation and distribution systems. Complete details are available from your Westinghouse sales engineer—or from Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh, Pennsylvania. J-40490

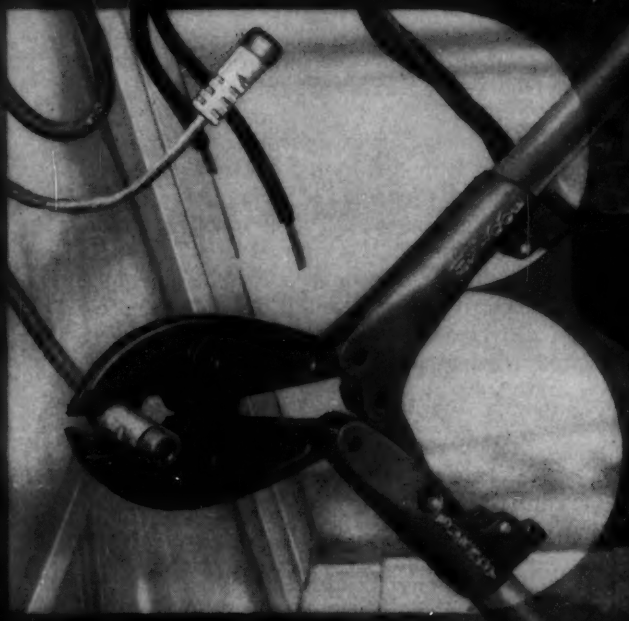
"Double unit, allowing customer's billing meter to remain in service (upper meter) while load is recorded by means of lower meter, which contains the contact device."

YOU CAN BE SURE...IF IT'S

Westinghouse

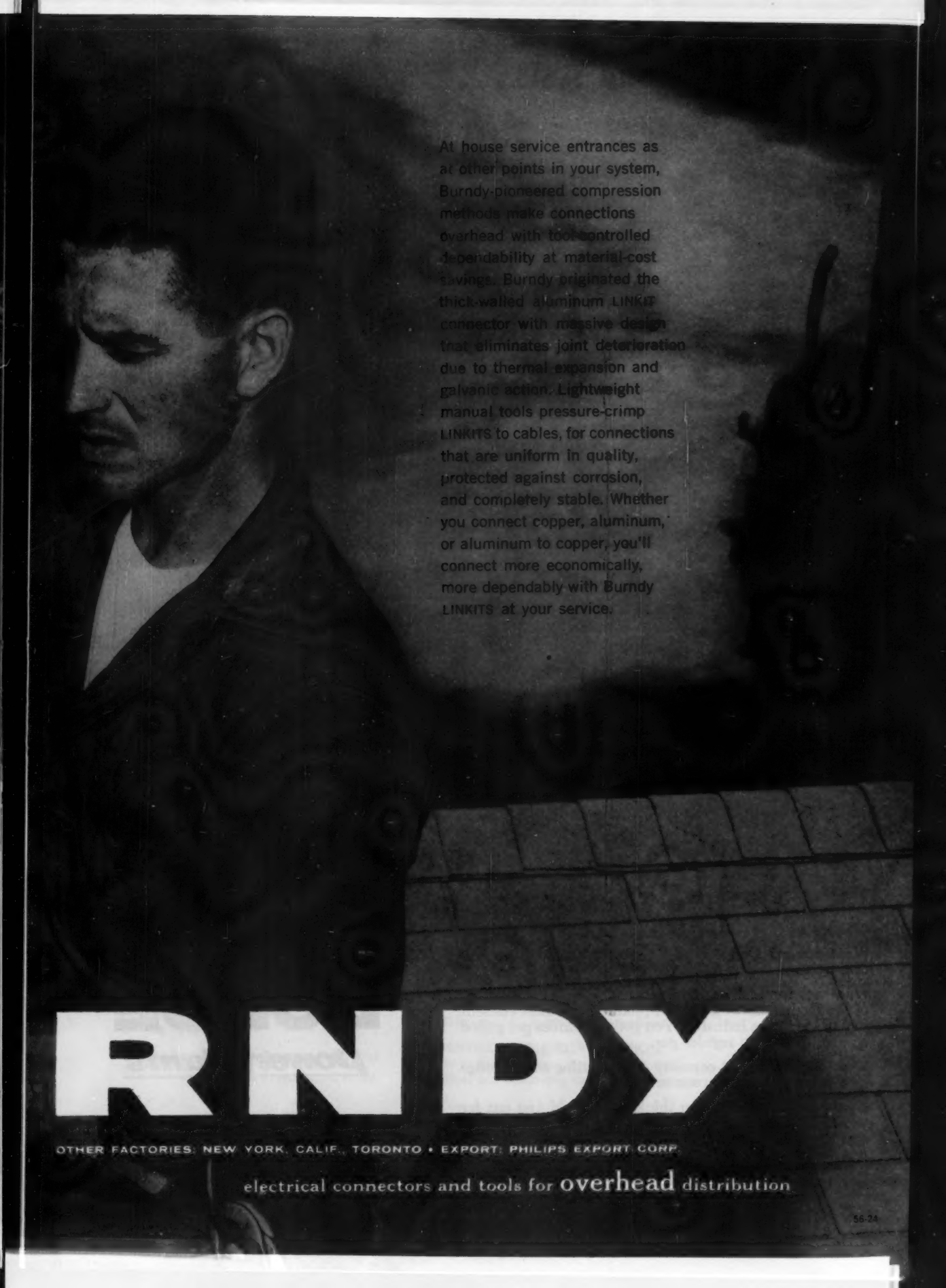
cost-cutting LINKITS . . .

at your service



BU

NORWALK, CONNECT.


At house service entrances as at other points in your system, Burndy-pioneered compression methods make connections overhead with tool-controlled dependability at material-cost savings. Burndy originated the thick-walled aluminum LINKIT connector with massive design that eliminates joint deterioration due to thermal expansion and galvanic action. Lightweight manual tools pressure-crimp LINKITS to cables, for connections that are uniform in quality, protected against corrosion, and completely stable. Whether you connect copper, aluminum, or aluminum to copper, you'll connect more economically, more dependably with Burndy LINKITS at your service.
RNDY
OTHER FACTORIES: NEW YORK, CALIF., TORONTO • EXPORT: PHILIPS EXPORT CORP.
electrical connectors and tools for overhead distribution
56-24

In actual road tests . . .

Dodge won top honors in test after test between comparable models of all three low-priced trucks. Special high-speed camera records actual finish of hill-climb test. From a standing start, test crews raced all three trucks up a 32% grade. Dodge was *first* by five lengths.

and on your job . . .

Dodge gives you more V-8 power, in every weight class, than either of the other two low-priced trucks. From 204-hp. pick-ups to 232-hp. tandems, the extra power you get in a Dodge means an on-the-job performance bonus for you. It means greater economy, too, because it cuts down engine strain, reduces wear and repairs.

Dodge *Power Giants* outpower, outperform the "other two" low-priced makes by wide margin!

Want power? Dodge outpowers its low-priced competitors by as much as 27 percent.

Want economical performance? The advanced design of the Dodge short-stroke V-8 produces the most efficient fuel usage in the industry. You get more miles per gallon . . . full power on *regular gas*.

Want extra payload capacity and handling ease? Dodge has 'em beat on both counts.

How about it? Don't you think you should find out for yourself? Just give your Dodge dealer a ring. He'll bring a truck right to your door and he'll show you certified test results that demonstrate Dodge is a winner in actual tests and on your job.

DODGE

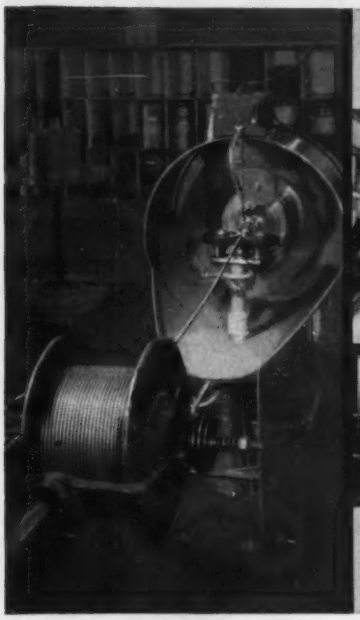
PowerGiants

MOST POWER OF THE LOW-PRICED 3

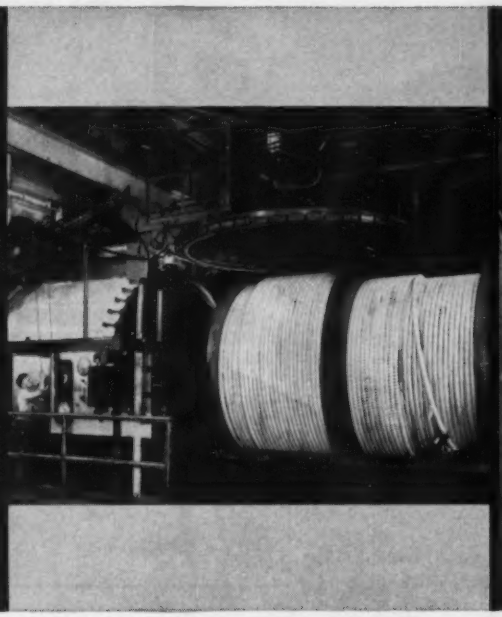
GENERAL CABLE

PAPER INSULATED
VERSATILE · RELIABLE
POWER CABLES

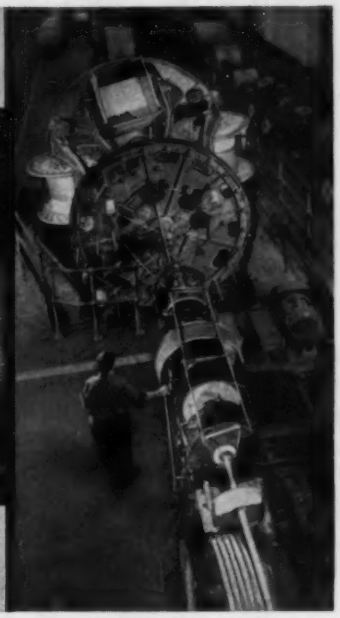
Manufactured at BAYONNE, N. J. • ST. LOUIS, MO. • EMERYVILLE, CALIF.



This machine forms steel strip into helical coil ducts or channels for use in gas filled or oil filled cable.



Impregnating Tank utilized in the heat-vacuum drying and oil impregnation steps in the manufacture of Paper Power Cable.



Large Cabling Machine used in cabling individually insulated conductors into multiple conductor assemblies.

- **SOLID TYPE**
- **LOW PRESSURE GAS FILLED**
- **LOW PRESSURE OIL FILLED**
- **PIPE TYPE**
  - **High Pressure Gas Filled**
  - **High Pressure Oil Filled**

The excellent operating record over many years and the superior electrical characteristics of paper insulated cable highly recommends its use for all power applications. Paper Power Cable is a predominant type in preference and use for voltages above 5 KV.

General Cable Corporation is equipped with the finest modern facilities for paper taping and with many years of know-how is in a position to supply a high quality product for all low and high voltage applications.

GENERAL CABLE CORPORATION
420 Lexington Avenue, New York 17, N. Y.
Offices and Distributing Centers Coast-to-Coast

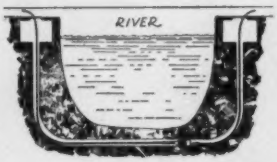
for quality and economy... **specify GENERAL CABLE**

10,000 FEET OF CONDUIT RODDED IN 8 HOURS!

Pick-up and Leader fittings meeting

Right, Electroline Steel Rodding Equipment feeds easily around the bends.

Below, Leader locked in Pick-up for either push or pull.



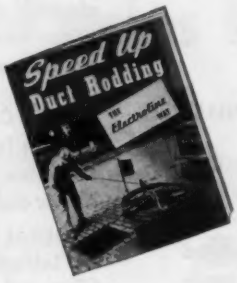
EASY DOES IT!—It's all in a day's work with Electroline Steel Duct-Rodding Equipment rodding 10,000 feet of conduit!

Light in weight, easily handled and stored, low upkeep: these are a few of the advantages utility men know to be true. But even bigger, more important advantages are—

- *Savings in the cost of labor*—for example, where it formerly took two gangs from one to two weeks on a given job, one gang, *in one-half hour*, has completed the same job—using Electroline Duct-Rodding Equipment.
- *Savings in original cost*—you get long life—double that of other types—when you buy Electroline Duct-Rodding Equipment. Add to that this fact: this equipment costs just about half as much for equivalent capacity! *There's true economy.*
- *Savings in Total Investment*—fewer sets are required because of the speed with which a job is completed and the equipment moved to other locations.

Speed up installation, reduce your costs; start now to use Electroline Duct-Rodding Equipment. Available for 3", 3½" or 4" Duct.

We've got a 4-page brochure which describes and illustrates more completely how this equipment can benefit you. We'll gladly send you a copy. Write us.



OTHER *Electroline* PRODUCTS

Electroline Company

4121 South La Salle St., Chicago 9, Ill.
In Canada: POWERLITE DEVICES, LTD., TORONTO

New Three-Phase *Curvacore* Transformer

CUTS Changeout COSTS

ALLIS-CHALMERS
DISTRIBUTION
TRANSFORMERS

ALLIS-CHALMERS

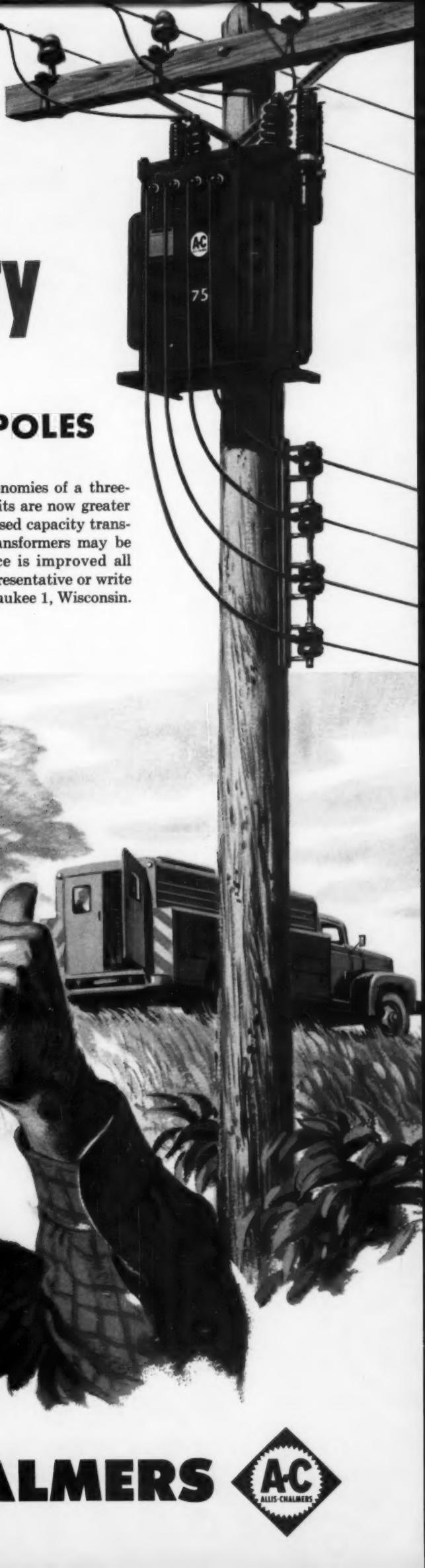
A-C
ALLIS-CHALMERS

Greater Capacity

...ON EXISTING PO

THE size, weight and resulting installation economy phase transformer over three single-phase units a than ever. Existing poles can be utilized for increased formers. Costly installation time is reduced. Transfo mounted directly to pole. Handling convenience is around. Get the complete story. See your A-C represen Allis-Chalmers, Power Equipment Division, Milwauke

ALLIS-CHA



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POLES

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aukee 1, Wisconsin.

ALMERS

A-C
ALLIS-CHALMERS

Greater Capacity ON EXISTING POLES

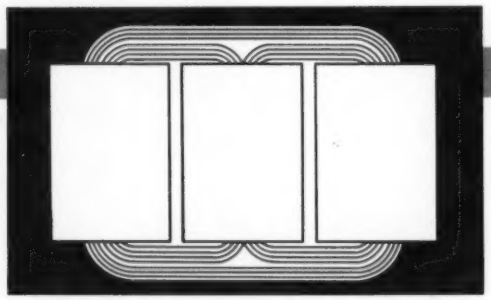
Average 13" Height Reduction

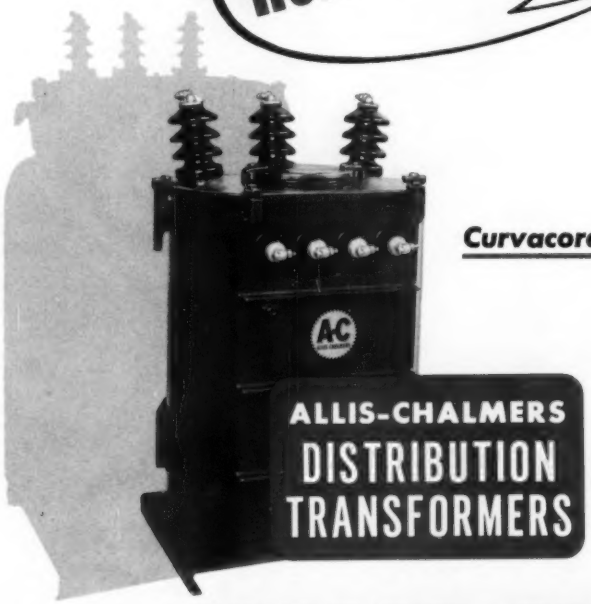
Average 25% Weight Reduction

HEIGHT and WEIGHT
Wound Core 3-phase Transformers
HIGH VOLTAGE — 12 kv through 14.4 kv delta
LOW VOLTAGE — 208Y/120 or 240 delta

KVA	OVERALL HEIGHT		WEIGHT	
	NEW	OLD	NEW	OLD
15	41½	50	610	665
30	44½	62	850	1120
45	51½	63	1115	1300
75	53½	68	1455	1920
112½	59½	70	1930	2565
150	65½	78	2285	3460

Here's Why





Curvacore Design Makes the Difference

A new wound core design, permitting the maximum use of preferred oriented steel, results in a compact core with low losses and low exciting current. Transformer height and weight are reduced considerably.

For complete information, see your A-C representative or write Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wis.

Curvacore is an Allis-Chalmers trademark.

ALLIS-CHALMERS

A-5383

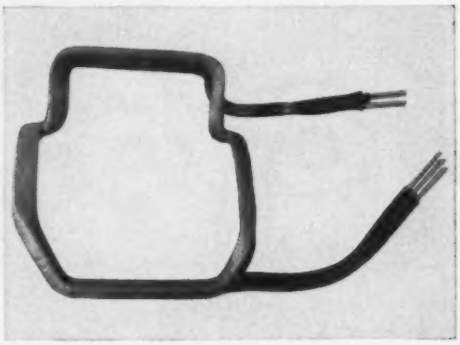
National Replacement Coils

Help Keep Vital Motors and Generators on the Job . . .

. . . IN THE ELECTRIC POWER INDUSTRY

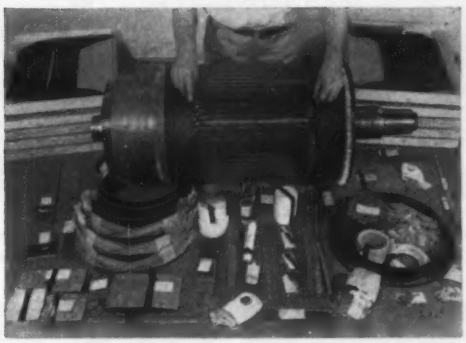
The photo shows part of a set of 54 stator coils for a large AC turbo generator. Rewinding equipment of this size is normally done on the job site. National can furnish the coils and send a full winding crew (or supervisory personnel with the customer supplying the labor), or National can supply the coils only (with the customer handling the complete installation).

. . . IN THE MINING INDUSTRY



Mines use National coils in the motors which power mine locomotives, shuttle cars, conveyors and other equipment. National "grew up" in the coal fields and really understands the electrical maintenance problems of the mining industry. The photo shows a typical armature coil for a mine locomotive motor.

. . . IN THE RAILROAD INDUSTRY



Some railroads send their traction motors to National shops for rewinding. Others perform the work in their own shops, using National replacement coils and winding supplies. The photo shows the variety of materials which go into a complete National rewinding kit for a traction motor armature.

. . . IN THE STEEL INDUSTRY

The steel industry depends on National for replacement coils because rugged, reliable National coils have proved their ability to meet the test of tough steel mill operating conditions. The photo shows armature coils for a DC mill motor being dipped in a silicone varnish to protect them against deterioration due to high temperatures.

When you need coils for any rotating electrical equipment, you can count on National for top quality, good service and a reasonable price. Ask your National field engineer for details on how National coils can help simplify your motor and generator maintenance problems. If you don't know him, just drop us a line and we'll arrange to have him get in touch with you.

NATIONAL ELECTRIC COIL COMPANY

COLUMBUS 16, OHIO, U. S. A.

ELECTRICAL ENGINEERS: MAKERS OF ELECTRICAL COILS AND INSULATION—
REDESIGNING AND REPAIRING OF ROTATING ELECTRICAL MACHINES

Power Cable that eliminated 26 competitive cables in time periods of from zero to 2,509 hours of a High Ozone Attack test—then went on to 6,000 hours.

Triplex—combining three wires in one compact assembly—makes possible neater services, fewer attachments, easier installations—for big savings.

ACSR that can meet or exceed your toughest requirements. Put Kaiser Aluminum's growing leadership in extra high-voltage research to work for you today!

Weatherproof—One of the nation's leaders in covered conductor, Kaiser Aluminum supplies the finest distribution, secondary and service cable in the field.

AAAC, developed and introduced by Kaiser Aluminum! Gives greater strength in high conductivity and is stronger than All Aluminum Conductor.

IF IT CARRIES CURRENT

KW CARRIES IT!

Now! Unsurpassed benefits for electric utilities due to Kaiser Aluminum's recent purchase of the Wire and Cable Division of U. S. Rubber, located at Bristol, Rhode Island!

Now from one source, you get all the established KW products plus all products of the new Bristol mill (formerly Wire and Cable Division of U.S. Rubber). For former U.S. Rubber products, the same quality insulations and product guarantee terms will be continued.

Now from one source, you get the most advanced technical assistance in the industry—the full cooperation of the research and development leaders of both aluminum and copper conductors.

Now from one source, better-than-ever service—from two plant locations (Newark, Ohio and Bristol, Rhode Island). This includes service from the production, engineering, sales and distributor organizations of both Kaiser Wire and the former Wire and Cable Division of U.S. Rubber.

For immediate attention to any request for electrical conductor products, engineering and research service, or further information, contact your nearest Kaiser Aluminum sales office or the KW distributor listed in your telephone directory.

Kaiser Aluminum & Chemical Sales, Inc., *Executive Office,* Kaiser Building, Oakland 12, California; *General Sales Office,* Palmolive Building, Chicago 11, Illinois.

Kaiser Aluminum

the bright star of metals

Portable Cord that gives you three times longer life than the average of molded cords of other makes. It's *proved* by 12,000 tests over a 3-year period.

Portable Cable: "It's the toughest, most flexible trailing cable we've ever used in our mines," says general superintendent of coal mining company.

Control Cable, backed by 67 years of experience in electrical wire and cable manufacturing. That means dependability—*proved security* for public safety!

Service Entrance Cable, now UL-approved for 75° wet applications! Improved design characteristics include pleasing appearance and ease of application.

In a ten-year span...

Carolina Power & Light

doubles its customers!

"We have more than half a million pressure-creosoted poles in service,"

says E. M. Geddie, Asst. to Line Supt.

And, to keep up with expansion, Carolina Power & Light adds about 20,000 new poles a year. All of them are pressure-creosoted; in fact, *the entire system is 100% pressure-creosoted.*

The retirement reserve for these pressure-creosoted poles has been set on a 45-year basis. "In this sandy soil," states Mr. Geddie, "poles would last less than one year if they were not pressure-creosoted."

In 1945, Carolina Power & Light Company, Raleigh, North Carolina, served 151,646 customers. By the end of 1955, it had 395,618 customers—more than double the number in a ten-year span.

Mr. Edgar M. Geddie, Assistant to the Superintendent of Lines, describes his company's part in this unusual growth: "In Raleigh alone we now have 151 different types of manufacturers. In the area we serve, there are some of the best-known industrial names in the nation. To keep pace with these industrial requirements for power, we have tripled our generating capacity to 1,580,000 horsepower. We recently invested $64 million in new industrial plant facilities, and, therefore, can offer low-cost, dependable power to industries thinking of relocating here.

"We cooperate fully with appliance dealers who are promoting 'electrical living' for home owners. From these dealers, our residential customers purchased last year, electrical equipment with a gross sales value in excess of $42 million.

"We always try to give our customers the best service for the least cost. For example, we have never raised our residential consumption rates since our company was founded in 1908."

If you would like more information on pressure-creosoted utility poles, and the way they can enable you to save money and establish better service for your utility, just get in touch with the nearest Chemical Sales Office of United States Steel or write to United States Steel, 525 William Penn Place, Pittsburgh 30, Pennsylvania.

CREOSOTE'S PAST ASSURES WOOD'S FUTURE

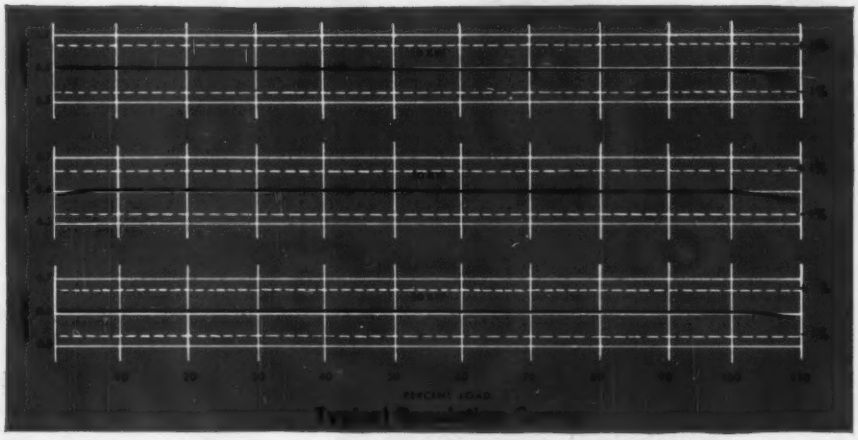
USS CREOSOTE

Sales Offices in PITTSBURGH, NEW YORK, CHICAGO, CLEVELAND, SALT LAKE CITY, AND FAIRFIELD, ALABAMA

UNITED STATES STEEL

Specify MOLONEY CONSTANT..

FOR CURVES LIKE THIS...

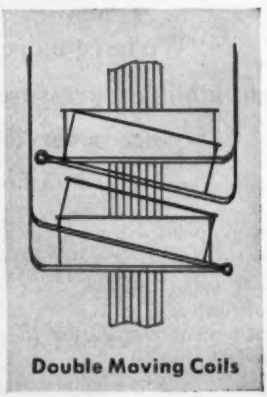


Moloney Offers A Complete Line Of Constant Current Transformers Which Provides Better Operating Performance For Your Series Street Or Highway Lighting Circuits.

Better Regulation . . . due to superior electrical design, plus Moloney's exclusive double-moving-coil construction makes Moloney Constant Current Transformers the most practical buy. A complete range of primary voltage and frequencies and secondary current ratings or multiple secondary ratings, permits a wide choice for *your* particular requirements.

Exclusive mechanical and electrical features make Moloney Constant Current Transformers the accepted choice for greater efficiency, better regulation and longer operating life.

Available in standard and special ratings conforming to ASA Standards, for Pole or Platform mounting, subway or station installation, with or without capacitors, and in completely self-protected, packaged units for fully automatic operation.



Double Moving Coils

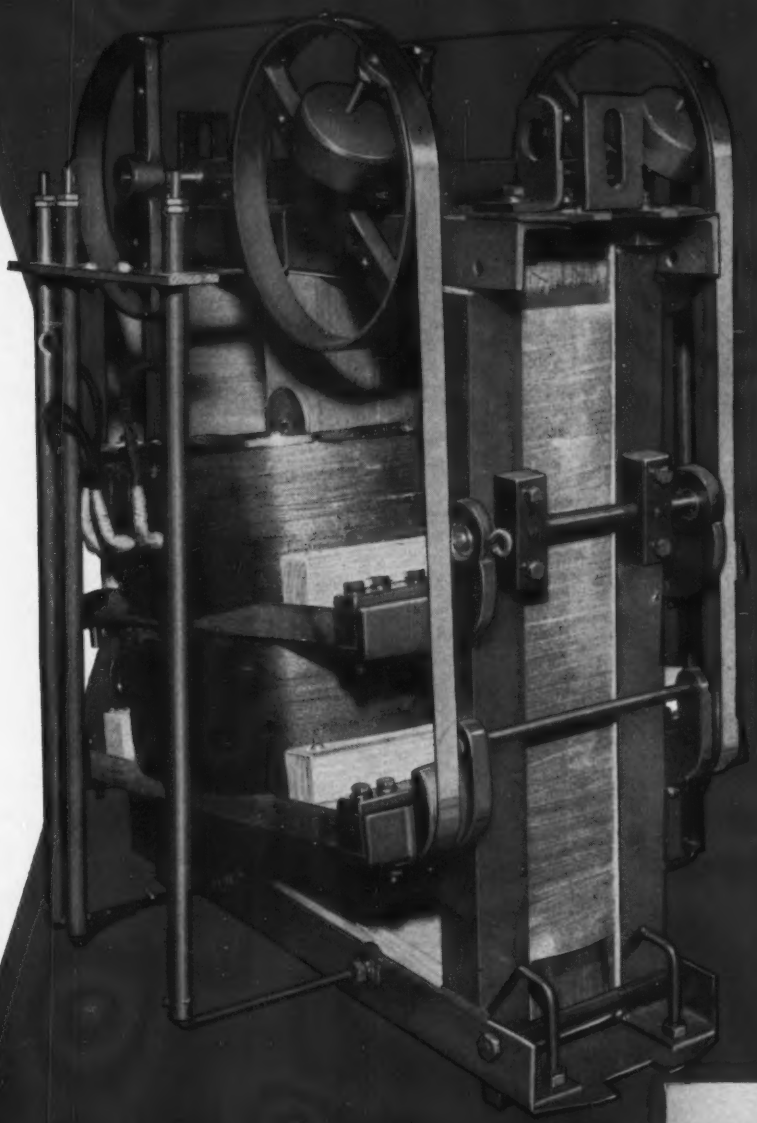
ME57-15

MOLONEY ELECTRIC COMPANY

Manufacturers of Transformers for Utilities, Industry, and Electronic Applications

SALES OFFICES IN ALL PRINCIPAL CITIES • FACTORIES AT ST. LOUIS 20, MO. AND TORONTO, ONT., CANADA

. . . CURRENT TRANSFORMERS

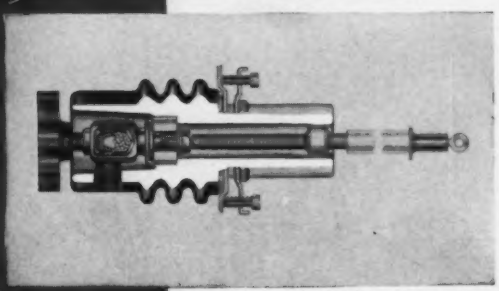


External Adjusting Handle Mechanism (Patent applied for)

Flexible Coil Leads

Counter Balancing Weights

Ball Bearings At Fulcrum Arm



Sidewall Bushings

MOLONEY ELECTRIC

"It's Everybody's Family Tree!"

The familiar utility pole might well be considered "part of the family". Through the years it has supported the wires that bring light, warmth, communication and labor-saving energy into every home.

In countless locations, these wires are being supplanted by SIMPLEX SELF-SUPPORTING AERIAL CABLES, which have built an unmatched reputation for efficiency and dependability. For sixty-seven years, Simplex has pioneered in the design, development and manufacture of all types of aerial cables used for both communication and power distribution. The benefits of this specialized experience are yours for the asking. Write for Catalog 1006, which gives detailed information.

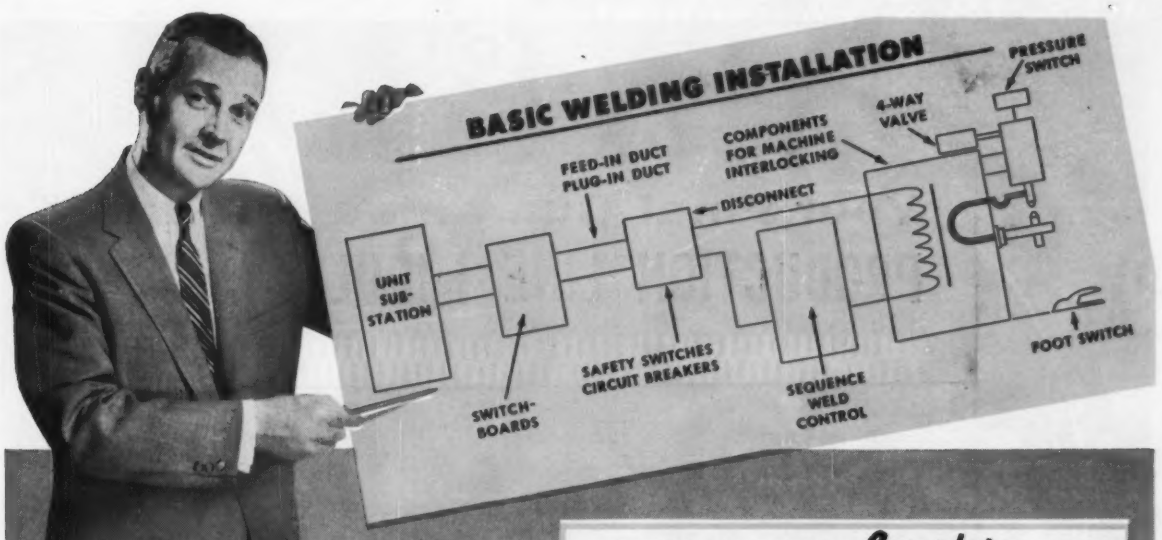
SIMPLEX WIRE & CABLE CO.,
79 Sidney Street, Cambridge 39, Mass.

LIVE BETTER ELECTRICALLY

Simplex

Wire sculpture by Henry Szafarz

Anhydrex Insulated, Neoprene Jacketed, Self-Supporting Aerial Cable



Here's the Easy Way

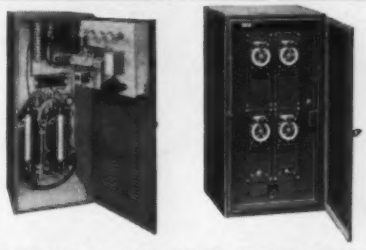
TO A BETTER WELDING INSTALLATION

• Whether you start from scratch or expand an existing operation, your Square D Field Engineer has two important things to offer to make your job easier.

First, he has the background which enables him to offer sound counsel at the planning stage. Second, he is backed by a complete line of performance-proven electrical equipment with which to put practical planning into action.

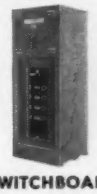
Field Engineers are available through Square D branch offices in all principal United States cities—and in Canada, Mexico and England. Backing up these engineers are the design and manufacturing facilities of 14 strategically located Square D factories and the localized services of a nation-wide network of authorized electrical distributors.

SQUARE D DOES THE *Complete* JOB!



ELECTRONIC and MAGNETIC WELDER CONTROL

SUBSTATIONS



SWITCHBOARDS

FEED-IN DUCT

PLUG-IN DUCT

SAFETY SWITCHES

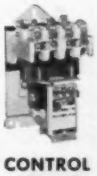
LIMIT SWITCHES

PRESSURE SWITCHES

4-WAY VALVES

PUSHBUTTONS

SELECTOR SWITCHES



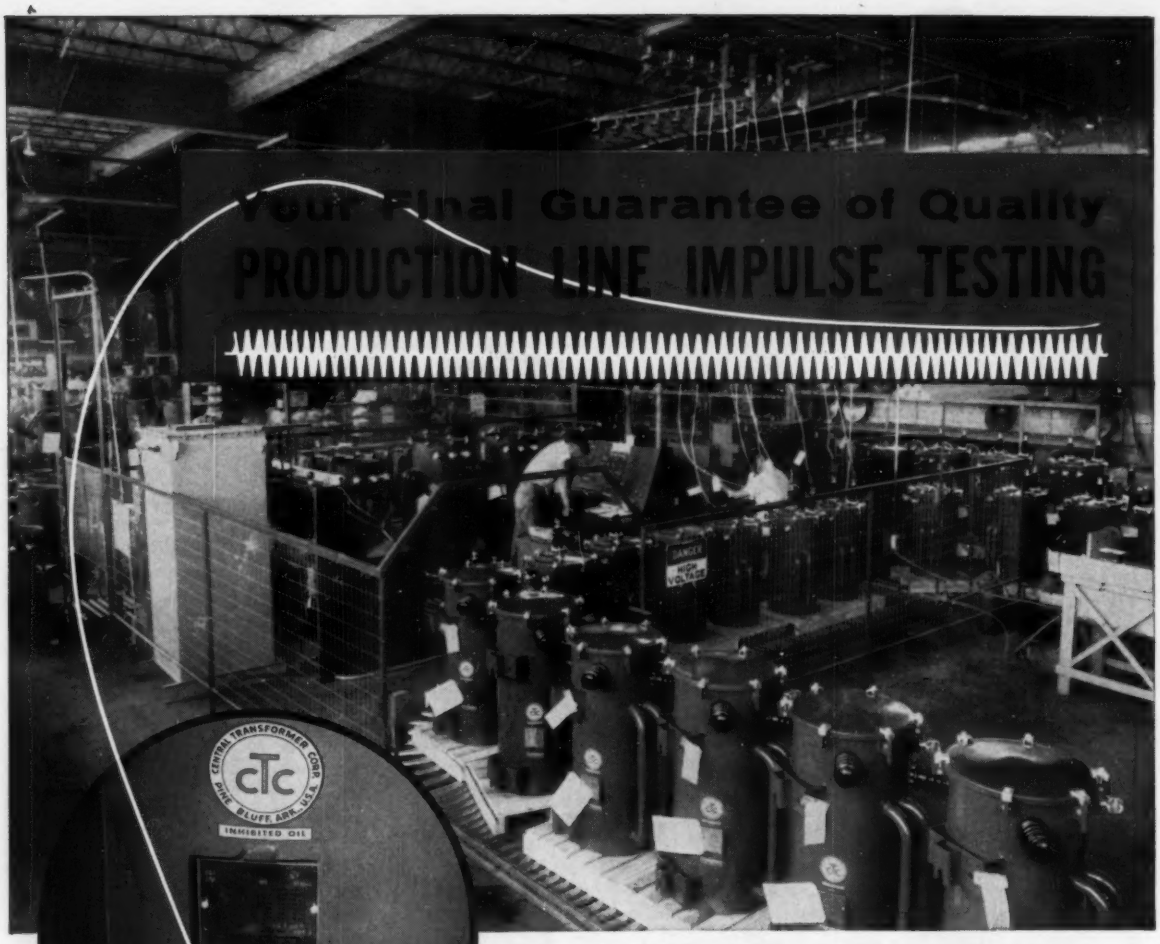
CONTROL RELAYS

FOOT SWITCHES

PILOT LIGHTS

NOW...EC&M PRODUCTS ARE A PART OF THE SQUARE D LINE

SQUARE D COMPANY



. . . at no additional cost

Every Central distribution transformer, 100 KVA and below, is impulse tested on the production line. This – the last inspection step before shipment – is preceded by all standard NEMA and ASA tests. Precision manufacture and rigid inspection without premium costs are important reasons why more and more Central transformers are specified. Your inquiries are invited.

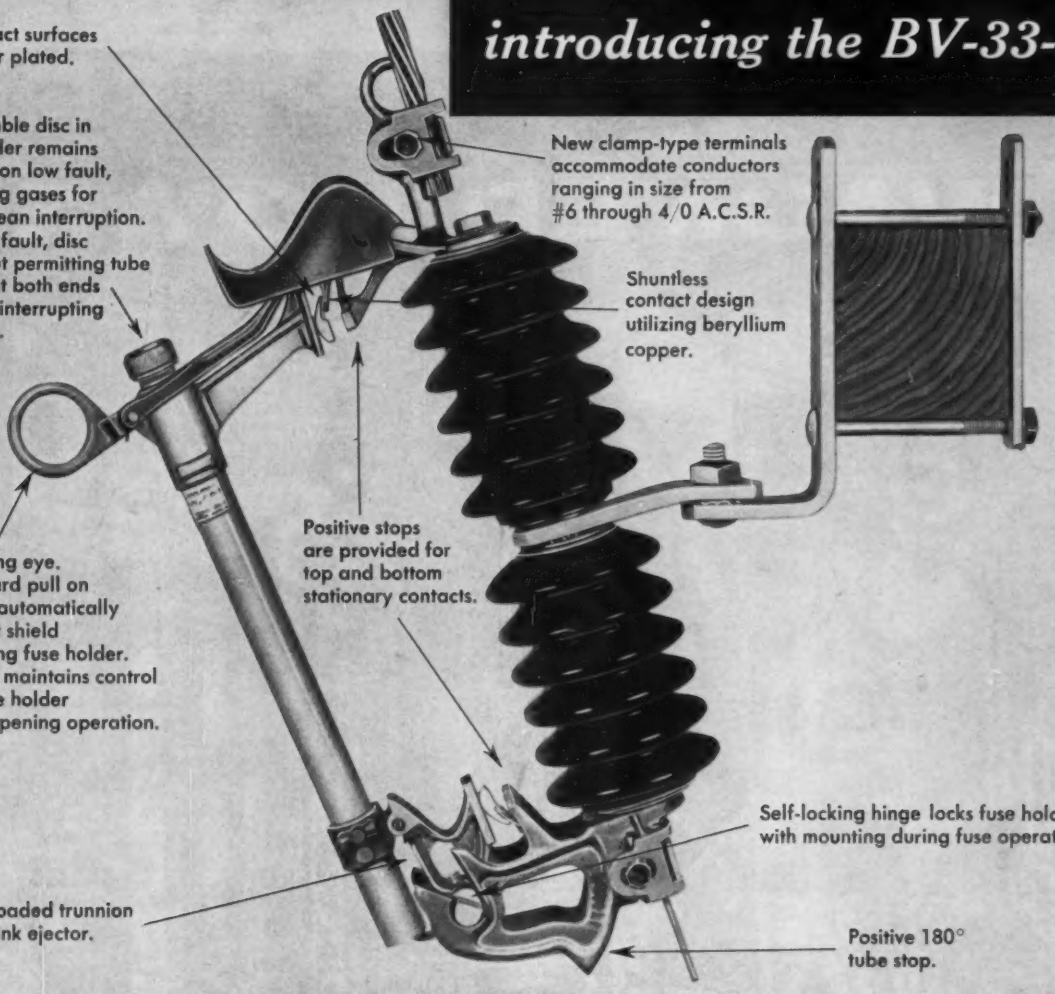
Designers and Manufacturers of Transformers Only

Central TRANSFORMER CORP.

PINE BLUFF, ARKANSAS *Sales Offices in Principal Cities*

A TYPE FOR EVERY NEED . . .
FROM THE SMALLEST TO THE LARGEST

introducing the BV-33-F


All contact surfaces are silver plated.
Expendable disc in fuse holder remains in place on low fault, restricting gases for quick, clean interruption. On high fault, disc blows out permitting tube to vent at both ends for high interrupting capacity.
New clamp-type terminals accommodate conductors ranging in size from #6 through 4/0 A.C.S.R.
Shuntless contact design utilizing beryllium copper.
Operating eye. Downward pull on this eye automatically lifts sleet shield unlatching fuse holder. Lineman maintains control over fuse holder during opening operation.
Positive stops are provided for top and bottom stationary contacts.
Self-locking hinge locks fuse holder with mounting during fuse operation.
Spring-loaded trunnion acts as link ejector.
Positive 180° tube stop.

A Powerful New Southern States Cutout For Handling Restricted or Heavy Faults

CHECK THE FEATURES of the powerful new BV-33-F! Whether you are a lineman, or an engineer responsible for applying cutouts on an entire system, we believe the BV-33-F will meet your requirements.

Despite its exceptionally high interrupting rating the BV-33-F clears restricted faults quickly and cleanly. Secret of its success on faults of any magnitude lies in the expendable disc in the fuse holder cap. On low faults the disc remains in place, restricting gases within the tube for maximum arc-quenching ability. On high faults the disc blows out and the cutout double-vents for maximum interrupting capacity.

The BV-33-F can be easily converted to a single-vented SV-33-F by replacing the pressure relieving cap with a solid cap.

For additional information on these new cutouts contact your local Southern States representative.

CHECK THESE INTERRUPTING RATINGS

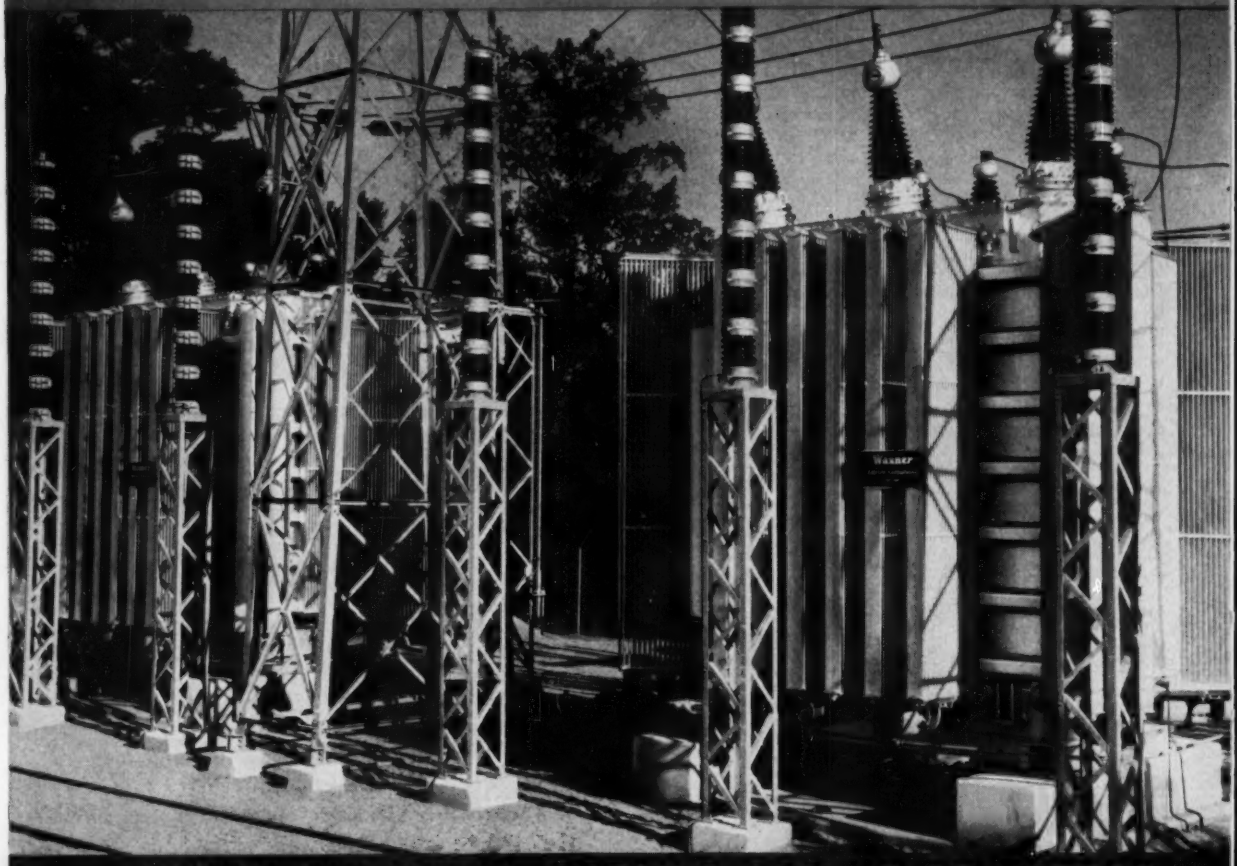
KV	Continuous Current Amps	Interrupting Capacity RMS Amps
TYPE BV-33-F		
5	100	8,000
7.5	100	8,000
15	100	6,000
25	100	4,000
TYPE BV-33-FH		
5	100	10,000
5	200	10,000
7.5	100	10,000
7.5	200	10,000
15	100	8,000
15	200	8,000
25	100	5,000

IN CANADA: Dominion Cutout Co., Ltd., Toronto

SOUTHERN STATES
EQUIPMENT CORP.
HAMPTON, GEORGIA

Quality is what you get

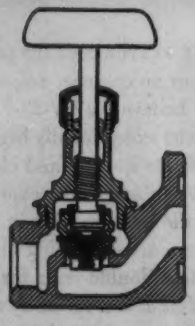
WAGNER POWER



THESE SIX SMALL DETAILS ADD UP TO BETTER

DEEP, PENETRATING WELDS. Submerged electro-arc melt welds penetrate deeply, are exceptionally smooth and uniform. Inspectors say, "the best welds made anywhere."

LIQUID ACTUATED THERMOMETERS. Much more accurate and dependable than thermometers that are actuated by a coiled bi-metal strip.



DRAIN VALVES THAT DRAIN *ALL* THE OIL. This 2" bolted-on drain valve, with auxiliary oil sampling valve, will drain the tank completely. Used on ASA standard rated transformers.

when you specify TRANSFORMERS

The extreme care given each Wagner Power Transformer—from inception to installation—is in keeping with Wagner's one objective . . . to build the best possible transformer that will give you years of completely dependable service.

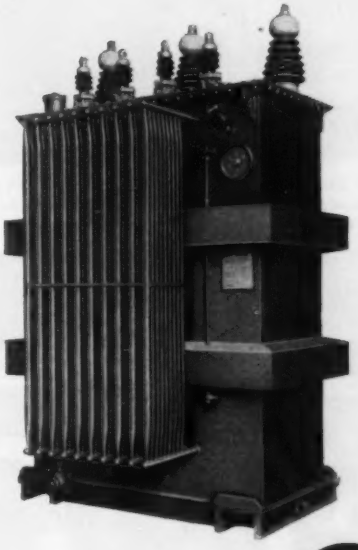
Here are a few of the big reasons why you gain when you specify Wagner:

POWER TRANSFORMER WINDINGS, in general, are disk type for the high voltage windings and helical type for the low voltage windings—best suited to obtain rigid bracing and provide low temperature gradients throughout.

LEADS AND TAP CONNECTIONS are effectively supported for safe electrical clearance and mechanical rigidity by means of firmly positioned bakelite tubes or strong clamps on the supporting members.

TANKS are designed for strength to withstand operating pressures, with braces of heavy fabricated structural steel on the sides and ends spaced to eliminate low frequency audio noises. All seam welds are made by a fully automatic welder.

Get the whole story . . . write for Bulletin TU-16D or better yet, ask your nearby Wagner branch to show you Wagner's sound-color movie: "Transformers in the Making."



LIVE BETTER ELECTRICALLY

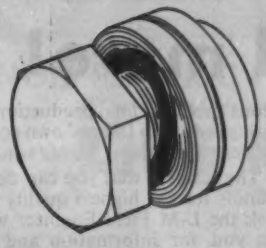
Wagner Electric Corporation

6456 PLYMOUTH AVENUE, ST. LOUIS 14, MISSOURI

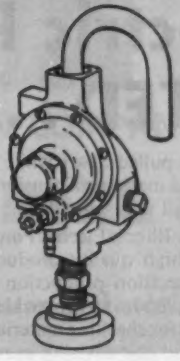
BRANCHES AND DISTRIBUTORS IN ALL PRINCIPAL CITIES

T57-15

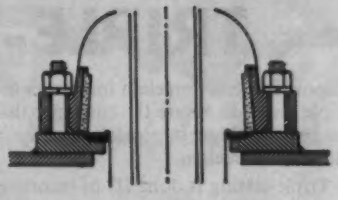
PERFORMANCE — EASIER MAINTENANCE



LEAK-PROOF MOUNTING BOSS. For thermometer wells, relay wells and radiator drain plugs. Serrated surfaces make annular grooves in the annealed copper gasket to form leak-proof joint.

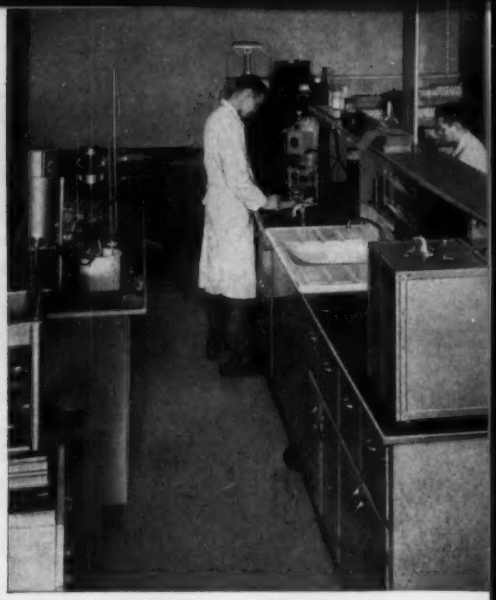


VACUUM-PRESSURE BLEEDER VALVE. Has large diameter diaphragms to actuate the valve mechanism when pressure or vacuum inside tank becomes too great. Located on the outside of sealed units for your convenience.

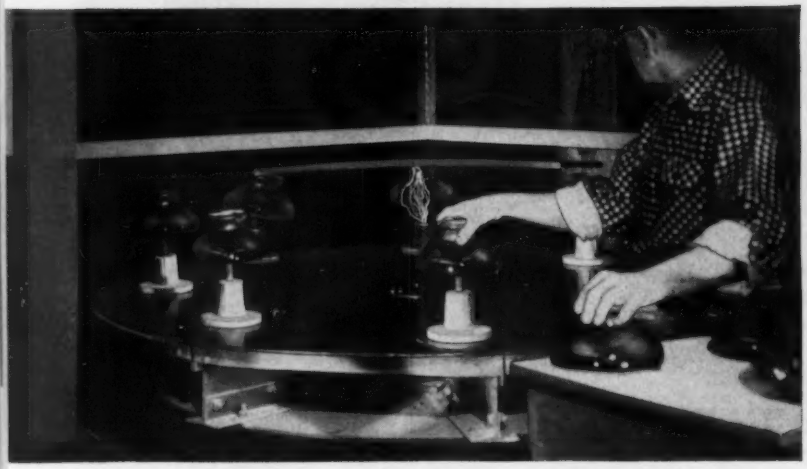


LEAK-PROOF BUSHING JOINT. The gasket is compressed between the porcelain shoulder of the bushing and the tank mounting flange—easy to tighten, simple to replace. Used on transformers with voltages 15 KV and below.

Insulators out of every finished batch are given this impact test, which checks the mechanical strength and density of the porcelain. Height from which hammer arm drops measures the amount of impact the porcelain will stand.



A corner of Illinois' new large laboratory. Here ceramic engineers test incoming materials, develop new ideas for improved production methods, and test products at various stages during and after production, to assure you dependable finished porcelain.



All Illinois pin-type insulators are given a 100% high voltage flashover test in this test equipment. Voltage builds up until it flashes over, or through, the insulator. If it flashes through, the insulator is, of course, rejected.

Here's a pin-type insulator that failed. This insulator was broken apart to show how the high voltage current searches out even microscopic cracks, like those indicated by the scorched lines at the top. A reject, of course.

Illinois Electric Porcelain is TRIPLE-TESTED . . . and more!

Illinois Electric Porcelain insulators are triple tested to assure the customer that he gets the highest possible quality in electrical porcelain.

Triple-testing is done (1) of incoming materials, in the laboratory; (2) during production, through our extensive quality-control system; and (3) after completion of production, before insulators are shipped, by rigid final testing. Some tests are 100%, like the "M & E" and electrical flashover tests; some are spot checks to destruction, like the impact test and over-voltage pull tests, in which strain insulators are pulled apart while under electrical and mechanical tension, to see how much pull they will take.

Today Illinois Electric Porcelain is producing high quality products with the latest precision production equipment. Illinois' laboratory provides extensive facilities for checking materials and processes, and for devising even more rigorous checks of final production. Galvanizing is done in Illinois' own completely modern galvanizing plant.

The result is that you can depend on Illinois for the highest quality product. Ask the L-M Field Engineer who calls on you for information and copy of Porcelain Bulletin DL8; or write Line Material Company, Milwaukee 1, Wisconsin.

ILLINOIS ELECTRIC PORCELAIN COMPANY
(McGraw-Edison Company Subsidiary) Macomb, Illinois

246-R

Distributed by **LINE MATERIAL**
Electrical Porcelain Insulators

High-Voltage Pin-Type Insulator. This and all other Illinois insulators are available with radio and TV noise-proof glaze in standard production.

TRIPLE-TESTED
To Assure Top Quality

At Illinois Electric Porcelain Co. the manufacture of electric porcelain is no longer an art or simply a skilled craft. New standards of material testing, manufacturing controls, and rigid final tests have made porcelain manufacturing a scientific production procedure.

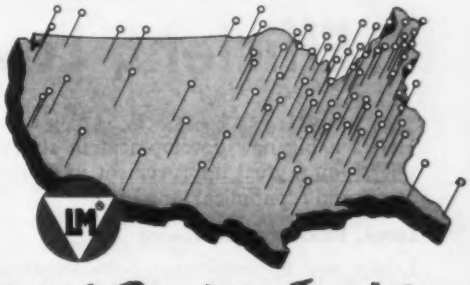
By triple-testing as set up by Illinois, we mean: (1) incoming materials are tested in a new, complete ceramics laboratory; (2) quality control during manufacturing assures uniformity and compliance with high standards in molding, pressing, drying, glazing, and firing processes; (3) rigid mechanical and electrical tests to destruction are made on a representative quantity of the finished product. The result is a product the user of Illinois porcelain can depend on for uniformity, consistently high strength and insulating value.

The high-voltage pin-type insulator shown is available in EEI-NEMA ratings 56-1, 2, 3, 4 for 23, 34.5, 46 and 55 kv with radio noise-proof glaze as standard.

Illinois Electric Porcelain products include pin and suspension insulators, strain insulators, switch and bus insulators, hardware and fittings.

For fast service, just pick up the phone now and call your nearest L-M office. Or ask your L-M Field Engineer for complete information and a copy of Bulletin DL8; or write Line Material Industries, Milwaukee 1, Wisconsin.

67 L-M Warehouses... there's one near you!



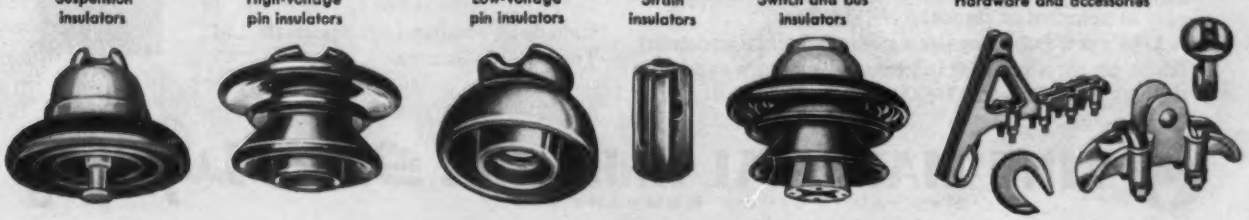
ILLINOIS ELECTRIC PORCELAIN COMPANY
(McGraw-Edison Company Subsidiary) Macomb, Illinois

Distributed by **LINE MATERIAL** *Electrical Porcelain Insulators*
McGRAW-EDISON COMPANY

285-R

L-M offers an extensive line of suspension and strain insulators, and hardware accessories

Suspension insulators | High-voltage pin insulators | Low-voltage pin insulators | Strain insulators | Switch and bus insulators | Hardware and accessories



L-M's new open-type Suburbanaire has high utilization of light output for neighborhood streets. Aluminum reflector can be latched directly to a standard NEMA head.

L-M's New Suburbanaire Provides Efficient, Low-Cost Street Lighting

Here's a big new development in street lighting that offers you a great improvement in performance, operation, and economical long life.

Large, Efficient Light Source

L-M's new open-refractor Suburbanaire is more efficient. The open glassware provides for excellent cooling. The refractor is designed to produce a large, efficient light source. Light patterns are developed from the entire refractor, not just from the area next to the reflector. Refractor glassware is available in Type I, standard Type II, Type II 4-way offset, Type III and Type V light patterns. Aluminum reflector is latched for easy attachment to standard NEMA head.

L-M's new Suburbanaire accommodates incandescent lamps up through 6000 lumens and mercury vapor up through the 250 watt (11,000 lumen) lamp.

Low Maintenance Costs

Since L-M's new Suburbanaire is open at the bottom, relamping can be done quickly and easily without removing the glassware. L-M's V-band attachment also permits easy field replacement of glassware when necessary.

L-M's new open-refractor design also eliminates the problem of trapped dirt and condensation which may collect in enclosed units.

Ask your L-M Field Engineer or Street Lighting Engineer for more information on features of L-M's Suburbanaire. Or write Line Material Industries, Milwaukee 1, Wisconsin. In Canada: Canadian Line Materials, Ltd., Toronto 13, Ontario.

McGRAW EDISON

299R

LM

LINE MATERIAL Industries *Street Lighting*

McGRAW-EDISON COMPANY

EDITORIALS

Lighting and the Monk Who Staked His All

There's an allegory concerning the approach to knowledge that's popular among professors of undergraduate philosophy courses. In a medieval monastery, one of the repositories of the knowledge that had been accumulated in the world up to that time, a young, inexperienced monk was trying to find out how many teeth a horse has. After much diligent searching among the great books—all in vain—he decided to look in a horse's mouth. He was caught in the act, and his horrified superiors told him that if the knowledge was not to be found in the books, then it simply did not exist! He persisted, however, and was burned at the stake.

Today the direct approach to knowledge is a little better recognized. But there is one thing in this electric business of ours that heretofore has also never been determined directly, and most certainly has not been set down! We refer to the residential lighting load curve in the United States. In the past it has always been ascertained by subtracting all other loads (appliances, heating, etc.) from the total residential load. This is inherently approximate, and leaves room for much error.

The Load Research Committee of the Association of Edison Illuminating Companies is now engaged in recruiting utilities for a test designed to give some idea of what this curve looks like (EW, Jan. 21, 1957, p 63). The test calls for 50 power companies to isolate and meter the lighting circuits of three groups of lighting customers—two in each of three consumption categories. Here's what the survey is expected to reveal:

1. Hourly, daily, and annual use patterns of residential customers' lighting load and limited data on appliance and total load.

2. Variations in regional and seasonal daily load curves for lighting.

3. Comparative importance of lighting load to customer's total load.

4. Relation of lamp wattage to the lighting load.

5. Relationship of family size to lighting load.

6. Relationship of size of dwelling to lighting load.

The study concentrates on obtaining the energy and demand data of the lighting load. Its cost to participating companies is far outweighed by the value of the information it is expected to yield. Estimates of cost per test customer are under $900, and tests actually run on five Lexington, Ky., homes cost a little more than $1,000 each.

Being national in scope, the study will yield the most definitive results if it has good geographical distribution among the participating utilities. In order to get this, AEIC needs a number of utilities all over the country from which to choose.

Frankly, industry support has not been at all what it should be. To date, only 18 companies have agreed to go along. In view of what the study's findings could mean, this kind of turnout does not reflect much credit on the industry.

We feel the AEIC Load Research Committee's residential lighting load study deserves your wholehearted support.

There is no present danger of being burned at the stake for looking in the horse's mouth.

What's a Customer?

The customer is not dependent upon you—you are dependent upon him.

The customer is not an interruption of your work—he is the purpose of it. You are not doing him a favor by serving him—he is doing you a favor by giving you the opportunity to do so.

The customer is not a rank outsider to your business—he is part of it.

The customer is not a cold statistic—he is a flesh-and-blood human being with feelings and emotions like your own, with prejudices and biases—even though he may have a deficiency of certain "vitamins" which you think important.

The customer is not someone to argue with or match wits against—nobody ever won an argument with a customer though they may have thought so.

The customer is a person who brings us his wants. If we have sufficient imagination, we will endeavor to handle them profitably to him and to ourselves.

Courtesy: Florida Power & Light Co

We must make the new organization structure function

Our technical committees seem adequate at the present

Some increase in allotments may be needed for section activities

Barrett Views New AIEE Policies

New president tells EW editors how new organization structure will sharpen AIEE management, and where local sections should look for money

What do you plan to emphasize during your term of office as president of AIEE?

Barrett: "I believe the most important thing is to make the new organization structure function. This year the departmental boards will do some things that the Board of Directors has been doing. This should reduce the number of board meetings and their length. The Planning and Coordination Committee will not be so busy since many problems will be referred to the department boards.

"I have asked the directors to approve a plan for delegating to the Executive Committee practically all routine matters. By using the departmental boards and the Executive Committee, we should be able to reduce the director meetings to three or not more than four this year. We may eventually go to two meetings per year."

What further steps do you think AIEE should take in its reorganization?

"I would not expect any further changes in the structural form of the Institute for two years. This will permit us to give the new organization a thorough trial."

Do you expect the directors to approve a substantial increase in section allotments?

"I think some increase will be necessary in order to support the expanded activities of the sections. However, I do not believe it is practical for a section to look to the Institute for all of its income. They must look for other support such as local dues or profits from education courses."

Is there any need for increasing the number of technical committees?

"We are in very good shape in this regard. A few have recently been added. As new areas of activity develop, it is our policy to organize promptly to serve them."

In the June issue of "Electrical Engineering," President Coover presented a new AIEE policy statement. What changes in AIEE activities will have to be made to conform with this policy?

"For the present I do not think we will discontinue any activities since we have adhered closely to the technical field. Perhaps we might eventually drop the Committee on Registration of Engineers under the proposed division of responsibilities since, under the proposed division of responsibilities, this work falls primarily in the field of the National Society of Professional Engineers. The new policy, as presented by Mr. Coover, if adopted, would have its major effect on the activities of the Engineers Joint Council."

How would the activities of the Engineers Joint Council be changed should the AIEE policy be adopted by the other societies?

"Well, in the first place, EJC would limit itself to the coordination of technical activities. This would have the immediate effect of permitting a change in its tax status from 501-C-6 to 501-C-3.

"We would have to transfer to the National Society of Professional Engineers such present EJC activities as the Governmental Activities Committee, the Committee on the Practice of Engineering, and the Engineering Manpower Commission, and probably some others."

Do you think we will ever have an overall engineering organization?

"I do not expect to see this development and doubt if it would be desirable. If we have an overall engineering association, it would

We won't discontinue any technical activities, but . . .

. . . we may shift engineering advancement to NSPE

I doubt if we'll ever have an overall engineering group

have to accept a 501-C-6 tax status, and this would bring the technical societies into the same position. Keeping the groups separate gives us much more flexibility."

What are AIEE plans for advancing the professional status of the engineer?

"Under the new policy, AIEE would be a scientific and educational society only. We would expect the National Society of Professional Engineers to handle the advancement of the professional status of all engineers."

How do you view AIEE's public relations activities?

" 'The engineer views hopefully that hitherto unattainable' is one way of expressing my feeling. There is much to be accomplished in this field and I am anxious to see a better job in the field of public relations as distinguished from publicity."

Coover Backs "Overall" Group

Tells AIEE it's a "step in the right direction;" Beverage wins Lamme Medal; directors and officers named

An overall organization for the whole engineering profession, subdivided into disciplines, but having individual membership covering all engineering fields was advocated as a "step in the right direction" by Pres M. S. Coover at the American Institute of Electrical Engineers meeting in Montreal late last month.

Coover reported that, at the request of AIEE's Board of Directors, he discussed engineering unity recently with heads of other engineering groups.

Other events at the meeting included presentation of the Lamme Medal to H. H. Beverage, Radio Corp. of America.

In accepting the Lamme Medal, Beverage noted that the field of international radio communications is expanding rapidly. He cited international TV, highly portable personal communications, and even the remote control of ships and planes by electronic traffic terminals on either side of the ocean, or across the continent, as possible future uses of the radio spectrum.

Newly elected vice-presidents are: R. B. Teare, Carnegie Institute of Technology; H. W. Oetinger, Duke Power Co; A. G. Johnson, Omaha Public Power Dist; O. A. Gustafson, General Electric Co; G. F. Tracy, University of Toronto; S. O. Osthagen, Allis-Chalmers Mfg Co.

New directors are: E. W. Morris, Westinghouse Electric Corp; W. R. Clarke, Leeds & Northrup Co; J. C. Strasbourger, Cleveland Electric Illuminating Co.

L. H. Hickernell, Anaconda W & C Co, was elected treasurer.

COOVER: Past president; BEVERAGE: Lamme winner; BARRETT: New president

New Lobbying Bill Seen to Stir Congress Fight

V. CRAIG RICHTER,
Washington Correspondent

Congress is hoping to tighten up its lobbying laws this year. But certain features of a proposed new lobbying bill promise to stir up a hot Congressional fight.

Major bone of contention in the bill are those features which appear to encompass certain advertising. Further, there are sure to be charges that the bill is seeking to infringe freedom of speech and press.

The new bill, known as the Political Activities Disclosure Act, is the outgrowth of investigations held by the Senate Lobby Investigating Committee under Chairman John L. McClellan (D-Ark.). McClellan's Government Operations Committee is now considering the measure.

The original hearings on the subject were sparked by the lobbying disclosures surrounding the Harris-Fulbright natural gas bill last year. But the hearings also covered other fields, including electric power.

The new bill tightens the Lobbying Law, passed in 1946, in these major respects:

- It broadens the act to cover part-time lobbying.
- It attempts to cover for the first time what is referred to as indirect lobbying.
- It sets up enforcement machinery, now lacking, and would provide for stiffer penalties.
- It places an overall limit on individual campaign contributions.

Indirect Lobbying Affected

Unquestionably the most sensitive section of the new bill is that dealing with indirect lobbying.

Under this provision, there would be an effort to deal with advertising or public relations campaigns calculated to inspire grass roots pressure for or against legislation. Everyone admits that the trend is toward this type of pressure in place of the old-fashioned lobbying in Capitol corridors.

The bill would make campaigns involving explicit or implicit appeals for or against legislation subject to the reporting requirements if they involve expenditures exceeding $50,000 within a 12-month period.

This section is causing the most concern. Observers ask who is to decide, and how will they decide, when a given institutional advertising or public relations campaign is aimed at influencing legislation.

It is difficult for a company president to make a speech on any controversial issue without touching on a matter pending before Congress. The same is true of much public relations and advertising material.

On this point, the committee said:

"The determination as to whether a group's activities are 'educational' only or a campaign to influence legislation may at times be a difficult one. As noted elsewhere herein, the fair presentation of factual material rather than mere opinion is a criterion of true educational material. The failure to include pertinent factual material which would permit the reader or listener to reach independent and informed conclusions, on the other hand, is an indication of an intent to accomplish some purpose other than education. Similarly the presentation of but one side of an issue which is the subject of legislation is an indication of a desire to influence rather than to educate, even if the presentation is strictly factual."

It should be remembered that neither the existing lobbying law nor the proposed one prevents anyone from lobbying anywhere, anytime, as much as they wish for or against legislation. The only requirement is that the people involved disclose their activities so members of Congress can evaluate the pressures brought to bear on them.

The committee has steered clear of attempting to cover one well-used channel of indirect lobbying. This is the trade association magazine. This technique has been used for some time by public power groups in Washington.

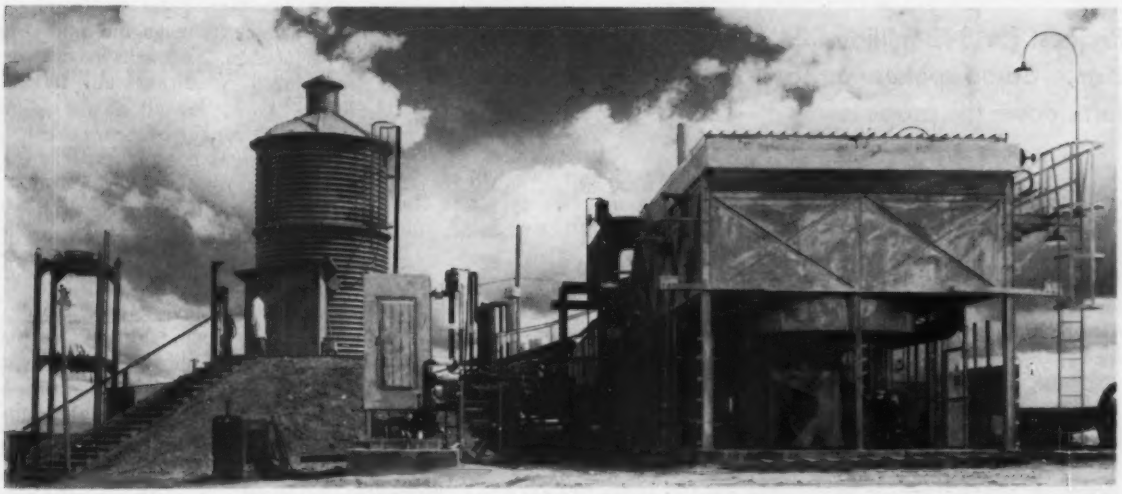
CAPITAL NOTES

Congress was moving rapidly last week on a number of key measures involving electric power:

- Senate Public Works Committee reported out the TVA revenue bond financing bill of Sen Robert Kerr (D-Okla.). It would allow TVA to raise $750 million in bonds. Opponents contend it does not rigidly control TVA's area of operation (although it defines the area in which bond proceeds must be spent) nor does it give Congress the control over TVA it should have. Chances for Senate approval are believed good; House intentions are less clear.
- Senate passed the Fryingpan-Arkansas project bill. The $160-million Administration-backed irrigation and power project in Colorado now goes before the House.
- House hearings were slated to begin on the Senate-approved High Hells Canyon Dam bill. Supporters were pushing hard for quick House action, hoping Senate sentiment would carry over to the House.
- Slated for Senate vote was the Niagara compromise bill. Chances for passage, especially in view of the compromise on the controversial preference feature, were regarded as good.

Former AEC Commissioner Thomas Murray has been named consultant to the Joint Committee on Atomic Energy.

As Congress moved to try and resolve the question of TVA's future financing, President Eisenhower settled another question by nominating Arnold R. Jones, deputy director of the Bureau of the Budget, to the TVA directorship vacancy left by the expiration of the term of Dr Harry A. Curtis.

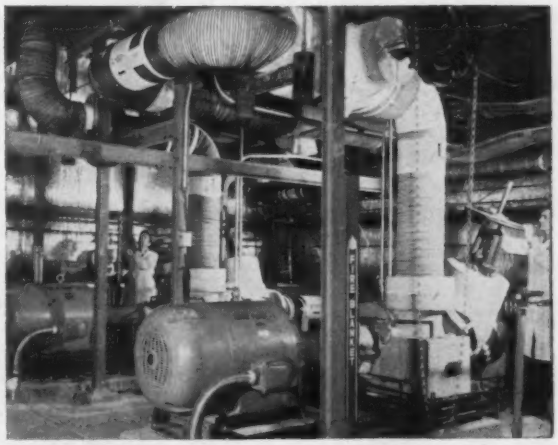


REACTOR, housed in tank-like structure, and air-blast heat exchanger, squatty building at right, will yield experimental data. Two power proposals (by Piqua, Ohio, and American & Foreign Power) hang on OMRE's results

Organic-Moderated Reactor Nearly Finished

The Atomic Energy Commission's organic-moderated reactor is expected to go critical in the next few weeks, reports North American Aviation, constructors. Object of the experiment is to prove feasibility of a power reactor moderated and cooled by hydrocarbons, which offer these advantages: High hydrogen content, so good moderators; high boiling points, obviating a high-pressure system; negligible corrosion with standard construction materials; no ready reaction with uranium; and become only slightly radioactive when irradiated.

Various available hydrocarbon liquids, such as diphenyl, will be checked under temperature and radiation conditions expected in a full-scale unit. Data yielded will include: Rate of decomposition, effect of this damage on reactor operation, requirements for successful reactor operation despite damage, allowable compositions and properties of hydrocarbons, and ways of maintaining them under steady-state conditions.



COOLING SYSTEM valves get checkup before 7,200 gpm coolant is circulated. A 16-Mw heat output is anticipated

NUCLEAR NOTES

Dresden's cost is going up. Reports indicate it will surpass the $45 million contract price. General Electric, which is building the plant for Commonwealth Edison Co, believes the cost will be slightly below GE's original estimate, as subcontracts have been let for 70% of the parts.

Enrico Fermi plant site has been attacked by Abel Wolman, a Johns Hopkins University professor and a member of AEC's Advisory Committee on Reactor Safeguards. He said, "Few sites in this region would pose as many meteorological issues as the one here chosen." The Fermi plant is being built at Lagoona Beach, Mich., by Power Reactor Development Co.

A government health physicist should be in each of the atomic industry's 1,500 plants to set permissible radiation standards, and to decide how long an area can be worked and which workers can enter. This is the proposal of Elwood D. Swisher, safety committee chairman of the Oil, Chemical, and Atomic Workers, which bargains for 8,000 employees at major federal atomic installations. The government should be reimbursed for his salary, Swisher believes. Meanwhile, some state workmen's compensation laws may require revision as a result of atomic industry.

Battle Brews over Hoosier Co-op Plan

Request for $42-million REA loan at 2% brings sharp criticism. Co-op spokesman says "we'll take it to court" if PSC turns down the proposal

A pitched battle is in the offing over a generating station proposed by a group of Indiana Rural Electric Membership Cooperatives. The first skirmishes have echoed all the way to the White House. And the victor ultimately may be proclaimed by the U. S. Supreme Court.

Hoosier Energy Cooperative, backer of the 198-Mw plant, is seeking a $42 million loan for the plant and transmission lines from Rural Electrification Administration. Its nine REMC members now buy wholesale power from private Indiana companies.

Widespread opposition includes attacks by private utilities in Indiana; by Harold W. Handley, state governor; John W. Van Ness, chairman of Indiana's Public Service Commission; and Republicans in Washington, D. C. GOP law-makers say they're concerned over what may develop if low-cost power, financed by 2% federal funds, is permitted to be sold to industrial users.

The battle has barely begun. R. E. Thomson of Greensburg, manager of Decatur County REMC, asserts the project is being considered on an economic basis, ignoring any power surplus in the area. Private firms say a 15% reserve now exists.

Called "Unfair Competition"

Gov Handley calls the project "unfair competition." He said the spread between a 2% rate and actual cost of money to the government makes it "inexcusable to divert such public money to finance operations deliberately designed to serve industrial customers."

Van Ness of Indiana's PSC asserts that the $17½ million yearly savings, which the plant would afford member REMC's would have to be made up by people in Indiana and elsewhere. If private companies could operate on the same tax-free basis as co-ops, he said, they could cut rates 30%.

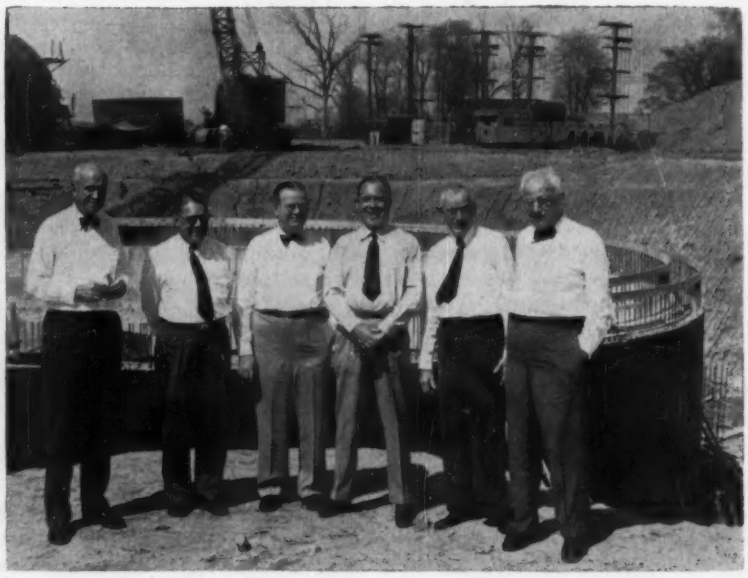
Thomson said co-op officials recognize that the PSC may turn down the proposal, but "we will carry it into the courts. We expect to clear all hurdles. But we don't know when."

Law Poses Hurdle

Among the hurdles is a 1935 law authorizing Indiana co-ops only to distribute power.

Answering criticism of the 2% interest rate, J. Robert C. Peek, Hoosier Energy president, says Congress can change the rate if it feels justified. Two bills have been introduced requiring all federal money to be loaned at the same interest rate paid by the Treasury, but passage is not expected at the moment.

Peek and other Hoosier Energy officials decline to reveal the site of the proposed plant or the route of proposed transmission lines—many of which, it is believed, would duplicate power company lines. This "information blockade" has brought charges that REA is fostering a super power network over the midwest, and may trigger further repercussions.



PE Directors Go "Atomic Sightseeing"

Philadelphia Electric Co directors recently made a four-day inspection tour of nuclear manufacturing and research facilities and nuclear power plants in a four-state area. They wanted further to acquaint themselves with nuclear power in its various stages.

First stop was at Westinghouse Electric Corp's commercial and research facilities in Pittsburgh. They also inspected Shippingport before leaving for Argonne National Laboratory near Chicago. They continued to Detroit to visit the site and inspect construction of the Enrico Fermi Atomic Power Plant, in which PE has an interest through its membership in Power Reactor Development Co. They ended the tour with a visit to General Electric Co's Knolls Research Laboratory near Albany, N. Y.

Directors pictured here, from left, are P. T. Sharples, H. N. Ramsey, R. G. Rincliffe, A. A. Garthwaite, W. D. Fuller, and H. S. Schutt.

Plymouth Electric Restores Burned-Out Line

After a forest-fire outage, crewmen put crossarms on stumps, replace poles later

Plymouth County (Mass.) Electric Co, by using an unusual approach, restored a 22-kv line to service quickly after a forest fire destroyed nine poles completely and badly damaged 14 others.

The fire broke out May 8 at 3 P.M. in the Myles Standish State Forest in the Town of Plymouth, Mass. At 6:02 P.M., service over the 22-kv distribution supply branch was interrupted. This line is about 7½ mi from the fire's origin.

At 6:25 P.M., the line was sectionalized and service was restored to two substations. One substation remained out of service 19 hr and 33 min, however.

To speed service restoration, trouble crews attached crossarms to stumps of the remaining damaged poles. Three crews worked through the night until noon the next day. After service had been restored, a hot-stick crew moved in to replace the stumps with new poles.

All damage to the 22-kv line was found in a 2-mi stretch of predominantly white pine growth. This particular line is 9 mi long, and has a 2-mi tap. Of this 11-mi total, about 8 mi of 30-ft right-of-way was burned over. A 3-mi stretch of the line situated on a 100-ft right-of-way was spared by the fire.

The fire continued spreading through May 10, burning about 18,000 acres. Although there were hundreds of distribution poles in the burned area, all escaped major damage.

LINE REMAINS IN SERVICE while hotstick crew transfers wires from burned stump to new pole. Top of stump is marked by hotstick held level by lower lineman

News in Brief

Florida Power & Light Co is considering Port Everglades as site for two 220-Mw plants to be built in 1960 and 1961. The utility has announced plans to build a third 220-Mw unit in 1962 . . . **Public Service Co of N. H.** is to build a 100-Mw, $20-million plant on the Merrimack River on a site yet to be selected. Total capital outlays planned through 1960 are $62.1 million for accelerated expansion. Method of this year's financing will depend on fall market conditions.

Mississippi Power & Light has broken ground on a $25-million addition to its Rex I. Brown station. The new unit will raise plant capacity to 385 Mw . . . C. G. Wright, president of **Otter Tail Power Co,** used a bulldozer to break ground for a $10 million annex to

(Continued on page 138)

Southwest A-Group Formed

A new atomic group has been formed to represent 13 electric utilities in a bold research and development program. Edgar H. Dixon, president of Middle South Utilities, Inc, has announced that Southwest Atomic Energy Associates will initiate a four-year, $5-million research and development program aimed at making atomic energy a practical supplemental fuel for the future electrical needs of Arkansas, Louisiana, Mississippi, Kansas, Missouri, and Oklahoma.

The program now being considered would consist primarily of studies and tests pertaining to a new, advanced reactor design not heretofore developed. This design is believed to have important advantages over other reactor designs in point of thermal potential efficiency and economic performance, the announcement said.

The group is to look toward ultimate construction and operation of one or more large atomic power plants with electrical capacities of 200 Mw to 400 Mw each. It is hoped that the program will demonstrate that plants of such size will be capable of producing electricity at costs comparable with those using other fuels.

Participating utilities are: Arkansas-Missouri Power Co, Arkansas Power & Light Co, Central Louisiana Electric Co, Inc, The Empire District Electric Co, Gulf States Utilities Co, Kansas Gas & Electric Co, Louisiana Power & Light Co, Mississippi Power & Light Co, Missouri Public Service Co, New Orleans Public Service Inc, Oklahoma Gas & Electric Co, Public Service Co of Oklahoma, and Southwestern Gas & Electric Co.

Figuring Fuel Costs

Charles E. Oakes, president of Pennsylvania Power & Light Co, looks to atomic energy for "leverage" against rising fuel costs. If PP&L's own coal consumption stays steady for 20 years, annual rises of 25¢ a ton in coal prices would increase fuel costs $210 million, he figured. Considering the expected capacity additions during that period, however, the fuel bill would go up $143.5 million more. "Hence," he told a group of security analysts and investment bankers recently in New York, "we feel the best way to avoid such a mess is to hasten development of competitive nuclear power."

Relocating Ground Rods

Relocation of ground rods and compulsory periodic checks of rural lines have been recommended by a coroner's jury in Edmonton, Alberta, as a result of an investigation into the accidental death of a road grader operator. August Gellert, 40, was electrocuted when he grasped a wire which had been pulled from a power pole by his machine. Apparently the grader's blade caught the ground wire runing down the pole and tore it partly away from the pole, disconnecting it from the ground rod buried about four feet away. Ungrounded, the wire could pick up a 6,900-v potential.

The jury suggested that power companies make regular inspection to assure that ground wires are covered and attached to the rods. It also was recommended that the rod be placed in the ground parallel to the power pole.

Case of the Squeaky Range

Sacramento Municipal Utility District Trouble Shooter Edward Washington feels he has seen about everything.

A housewife complained of a squeaky electric range. Washington found the cause, all right. There was a mouse nest in the insulation. Not only had the mouse used the glass insulation for a nest but he had chewed off wiring insulation for nest lining.

"Stop Attacking TVA . . ."

Tennessee's Shelbyville and Bedford County Chamber of Commerce has threatened to resign from the U. S. Chamber of Commerce unless the national organization stops attacking Tennessee Valley Authority. The threat was made in a letter to Arch N. Booth, executive vice president of the U. S. Chamber, by J. M. Tune, president of the Tennessee group.

"It is our recommendation that you and all other associations leave TVA alone as it is at the present time," Tune said in the letter. "If it is your thought to sponsor activities against the TVA, I would like to advise you that you have one less member."

Report from Russia

Russia could surpass America within ten years in the field of electronics, believes Robert F. Schulz, an electronics engineer for Sylvania Electric Products, Inc. Upon returning recently from a visit to Soviet laboratories and plants, he said:

"They can do anything we do now—if they decide they want to do it. Moreover, they now surpass us in some fields." American science, he said, could profit greatly "if we could draw on the research being done in Russia, and to do this we'll need many engineers qualified in the Russian language."

Schulz was one of four men invited to Moscow in May to attend a five-day meeting of Russia's equivalent of America's Institute of Radio Engineers.

McGRAW AWARD goes to L. E. Barrett, left, for his contributions to the electrical industry. J. N. Newton, Sr., Oakes Electrical Supply Co, Holyoke, Mass., makes presentation

NAED Exec Scores 'Expediency' at Confab

"Distribution by Expediency" was the big bogus pointed out to some 3,000 National Association of Electrical Distributors members at their 49th Annual Convention held in Washington in May.

In a no-punches-pulled, closed-session speech executive director A. W. Hooper wound up the convention with an indictment of the unhealthy growth afflicting the electrical wholesaling business: the "special deal." And, says Hooper, distribution will be caught in the bight as a result of it. Electrical wholesalers look to the manufacturer for some special advantage—usually price—and the manufacturer is supplementing the distributor with supply avenues of his own. The wholesaler is the sufferer and, Hooper says, "We've got to make our choice . . . whether or not we believe in the necessity of the full-functioning distributor . . . not for tomorrow . . . but for where our business expects to be five years from now." On the brighter side, this year's convention was termed "the best yet".

Electric heating came into the spotlight in an address by W. C. Wallis of Southern Supply Co, chairman of NAED's electric heating committee. According to Wallis, the industry now has 40 manufacturers producing some $20 million worth of equipment. Wallis told fellow distributors to get on the electric heat bandwagon. Otherwise "specialists" will get into it and the distributor will have difficulty getting started.

Distributors should support the Certified Lighting program, according to NLB manager L. C. Messick. They stand to gain in view of the renewed and increasing utility interest in lighting.

Barrett Gets McGraw Award

L. E. Barrett, immediate past president of NAED, was awarded the 1957 McGraw Award for making the most outstanding individual contribution to the distributing branch of the electrical industry. Barrett is president of Barrett Electric Supply Co, St. Louis. He is a member of NAED's executive committee, and its representative to the NAWB. The Association's Junior Achievement Award went to JAELCO, Dayton, Ohio for its transistor radio transmitter-receiver.

George Albiez, Englewood Electrical Supply Co in Chicago, was elected NAED president. He succeeded R. J. Brown, manager of marketing, General Electric Supply Co, Bridgeport, Conn.

NELPA Hits Gas Invasion of Pacific NW

Where will natural gas go in the Pacific Northwest? This was the big question in everyone's mind at the recent meeting of the Business Development Section of Northwest Electric Light & Power Association.

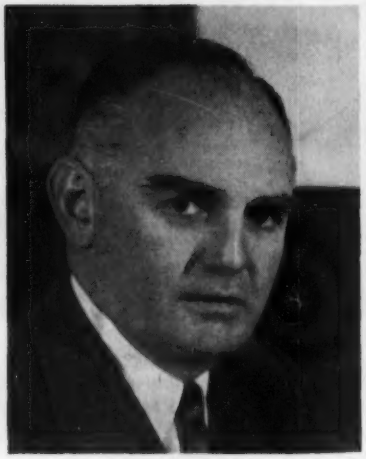
Idaho Power Co president A. S. Gilbert reminded his audience that the region has a higher kwhr usage than any place on earth, but that gas represented the nation's sixth largest industry, and that it was intent on reaping generous benefits from heavy investments. Electric utilities, while not "running scared", are concerned.

Power companies must key-up their ad campaigns. The public relations approach is no longer adequate, according to General Electric Co's J. R. Poteat, manager of the Range & Water Heater Division. More dollars are needed for promotion, and advertising.

But all is not dark. J. T. Kimball, Idaho Power Co vice president called the industry's attention to the predicted 80% jump in real purchasing power in the U. S. by 1975. Electric utilities have to go after their share. Salesmanship, he says, is the answer.

NELPA called for a liberalization of NEC service entrance and feeder calculation methods. Spokane inspector J. A. Paxton cited tests of the NEC methods that he figures make them too high (EW, Oct. 15, 1956, p 139). Proposal sets up 11 kw plus 35% of connected load in excess of 11 kw, regardless of nature of the load.

ALL-ELECTRICAL HOME is inspected by, l to r, O. Zwanzig, A. S. Gilbert, IPCO, and F. Reis, Pacific P&L



McAFEE

TURNER

VENNARD

These three men to speak at EEI Industrial Relations Committee's luncheons about . . .

Enlarging Employee Effectiveness

10th Annual Round Table Conference will hear speakers and discuss various problems in "how-to-do-it" groups

Creative communications, effective supervision, and increasing the industry's effectiveness will be discussed by luncheon speakers at the 10th Annual Round Table Conference sponsored by the Edison Electric Institute's Industrial Relations Committee. It will be held Sept. 23-25 at the Drake Hotel, Chicago.

Creative Communications

With "Creative Communications" as his subject, J. W. McAfee, president of the Union Electric Co and vice president of the Edison Electric Institute, will address the Sept. 23 luncheon. He will point out the importance of every employee being a representative of his company to fill the role as an ambassador of good will for it. In this respect it will be necessary for the employees to follow through on the policies set up by the management. These policies may not only be for the demand of efficient service but also accepting the utility as a good citizen.

W. O. Turner, president and general manager of Louisiana Power & Light Co, will be the speaker at luncheon on Sept. 24. On the topic of "Toward Effective Supervision" he will discuss how it is up to management to recognize the potential within people. Can this supervisor enlist the greatest cooperation from his fellow workers? Will the work of his group be the most efficient? Answers to questions similar to these will receive critical analysis from the Louisiana Power & Light president.

Urges Effectiveness

At the third luncheon, Sept. 25, Edwin Vennard, vice president and managing director of EEI, will discuss "Increasing the Industry's Effectiveness." The obligation of management to its employees will be stressed. Part of this will include management's measuring the extent of employees' knowledge and information of the American economic system and the power business. He will discuss setting up a series of information courses for employees. It will cover the following subjects:

1. The American economic system.

2. The history of American freedom.

3. The power business.

The topics of the above three luncheon speakers will tie in with the overall theme of the conference which is "Enlarging Employee Effectiveness." Different phases of the theme will be presented by four keystone speakers. Following this, conferees will discuss these topics in "how-to-do-it" groups.

Committee Named

The subcommittee of the Industrial Relations Committee is under the chairmanship of Frank M. Osta, vice president, employee relations, Niagara Mohawk Power Corp. Other members are: H. F. Carr, manager of personnel department, Pacific Gas & Electric Co; M. F. Osterling, director of personnel, Hartford Electric Light Co; C. E. Parker, manager of industrial relations, Commonwealth Edison Co; C. R. Stockhus, vice president, employee relations, Union Electric Co; and E. A. Werner, personnel manager, Gulf States Utilities Co.

This conference is open to management personnel of business-managed electric companies. For reservations, write E. S. Evans, secretary, Industrial Relations Committee, Edison Electric Institute, 420 Lexington Ave, New York 17, N. Y.

98.6% of Community PS Workers Take Part as . . .

Thrift Plan Supplements Pension

Six out of ten employees now own stock in company compared with 1-31 U. S. average; company matches deposits

RUTH PHILLIPS STEINHAUSER, Director of Public Relations, Community Public Service Co, Ft. Worth, Texas

A thrift plan that supplements Community Public Service Co's employee pension plan enables personnel to accumulate additional funds in the form of savings or securities for retirement years. Participation is optional in the thrift plan which was launched last April.

At its inception 98.6% of the eligible employees signed up as original participants. Of these, 82.4% asked that all or part of their thrift funds be invested in company stock.

Since only one out of every 16 adult Americans owns stocks at all, and only one out of 31 American workers has ownership in the company for which he works, Community's score of six out of every ten regular employees as company stockholders probably sets something of a record in the electric utility field.

Company officials believe several worthwhile ends are accomplished by the plan:

- It helps supplement employee income at retirement age in a period where inflation is tending steadily to depreciate the pension plan dollar.
- Stockholders benefit from the good effect of the thrift plan on employees.
- Increased ownership by workers resulting from the plan is socially desirable and is in keeping with our American system of private enterprise.

Employees in the plan may elect whether their individual funds shall be invested in company common stock, in government bonds, or divided between the two securities; or they may stipulate that the fund be held in cash. Employees who have reached the age of 25 and have been on the regular payroll for at least one year are eligible.

Signing up for the plan is made attractive to employees by the fact that the company matches employee deposits on a basis of 50, 75 or 100%, depending upon the individual's length of time in the thrift plan. The company contributes 50% of the deposit made by employees who have been in the plan for less than five years; 75% of the deposit of those in the plan between five and ten years; and for ten years or longer, the company matches deposits dollar for dollar.

For original participants in the thrift plan, length of service under the pension plan was recognized in determining the company's contribution.

Employees in the thrift plan elect whether to deposit 2, 4, or 6% of their basic salaries through monthly payroll deductions. Percentage changes may be made at the beginning of each year.

Has Make-up Feature

A "make-up" feature permits the employee with 2 or 4% participation during any given year to make up the difference between that and the 6% maximum during the next two years by depositing 8 or 10%.

Of the 98.6% of original eligible signers, investment directions designated that 83% of the total fund be invested in company stock and 15.6% in government bonds. Only 1.4% was to be held in cash.

Employees may change investment instructions every six months if they desire, but not more often. They may cancel investment directions any time and instruct that their funds be held in cash.

Trustee for the thrift plan is First National Bank of Ft. Worth. The bank invests money deposited by employees and contributed by the company in accordance with employees' directions; holds in safekeeping all investments and cash; and makes distribution of such holdings to employees in accordance with the plan.

The thrift plan committee, which administers the plan, is made up of seven officers and employees. They are R. L. Bowen, president; N. R. Parsons, vice-president and treasurer; H. L. Stout, vice-president and assistant secretary; Bennett L. Smith, secretary; C. L. Cooke, assistant secretary-assistant treasurer; C. C. Wagget, personnel director; and W. J. Millican, safety director.

C. L. Cooke, committee chairman, answers employee inquiries on the plan's operation. He gives each participant a detailed written statement of his account at the end of each year.

Employees in the plan understand that it is designed to help them accumulate a reserve for retirement years, and is not a savings account from which cash may be withdrawn for needs such as buying a home or a car. Penalties make the withdrawals unattractive.

Each employee's fund becomes available to him "in cash or in kind" upon retirement or when employment is terminated.

The company's contributions to each participant's account become vested in that participant immediately upon payment to the trustee and belong to him permanently. They are not to be turned over to him, however, except upon liquidation of the employee's account when he retires or resigns. In the event of his death, of course, the money or securities will be turned over to his heir.

Dividends are credited to the employee stockholder's thrift plan account. They are not paid directly to the individual.

A marked increase in employee interest in company financial affairs has already been noted, according to company officials. Employees are also showing increased interest in economical operations. One lineman was heard to say, "Bill, cut that copper the right length next time. You just wasted 2 ft on that last one. Remember we're stockholders now. Gotta make sure of those dividends."

Meet Hazen Stetson, Top Man Down East at Maine Public Service

Stet, former farm boy and amiable townsman, reaps rewards after years of hard work; cultivates friends and garden

"We will never be the largest utility in the country but there is no reason why we cannot be one of the best."

An ambitious but certainly not impossible goal. Especially when the man behind these words has, throughout his life, set high goals for himself, his family, his community, and his company.

He's C. Hazen Stetson, who was recently elected president of Maine Public Service Co, a small but rapidly growing utility located in the heart of Maine.

"Stet," as he is commonly known to employees and town folk alike in the city of Presque Isle, is a man of many interests and sides.

On the one hand is the man whose solid qualities of ability, strength of character, and hard work could not help but elevate him from a boyhood on a rocky, run-down farm to utility president.

On the other is the friendly, amiable fellow whose employees—from officers to workmen—are often found chatting with him after hours in his yard, where they find him busily pursuing some garden project whenever time permits.

Had Rugged Start

Stet's early background was tough, the "spine-strengthening" type. Born on a poor farm in Boxford, Mass., he was next to the youngest in a family of eight children. About the time he entered high school his father became an invalid and the elder children took over support of the family.

Stet shared the load by carrying newspapers, mowing lawns, and working on a farm, thus enabling him to complete high school. Then, to earn enough money to graduate from Salem Commercial School, he spent his evenings and weekends working in a chain grocery store.

His first regular job was with an electrical contracting concern—where he was hired as combination bookkeeper-secretary. But his duties covered a wider range—"from janitor work to journeyman's helper."

Began as Typist

Stet launched his utility career in 1923. Starting with Haverhill Gas Co as a typist and assistant cashier, he rose through various posts to chief clerk of the accounting department in 1930. It was in this same capacity that he started his first stint with Maine PS in 1937. Then in 1946, after a four-year spell with Central Indiana Gas Co, he returned to the Maine utility as assistant treasurer.

From there he skyrocketed to the top—secretary in 1947, treasurer in 1948, clerk in 1949, vice president in 1951, and executive vice president in June of last year. Now, at 54, he's president.

During unoccupied weekends, Stet likes to spend his time "completely relaxing from work-a-day problems" at the woods camp he and his family devoted many hours to building at Portage Lake, Maine. Stet also has a keen interest in photography and is quite a 35-mm camera enthusiast.

His greatest "hobby" however, is his family. He and his wife, the former Alice E. Jones whom he married 29 years ago, have three grown children. They are Mrs. Virginia Gilmore, whose husband is with Mountain States Tel & Tel at Helena, Montana; Charles, Jr, a cadet engineer of Public Service of New Hampshire; and Barbara, his younger daughter. His greatest ambition—to see all three graduate from college with degrees in their chosen vocations—should be realized next June, when Barbara is scheduled to complete her fourth year at Bates College.

A well-liked townsman and leader, Stet has, through the years, been president of just about every civic organization in the area. They include the Presque Isle Chamber of Commerce, Kiwanis Club, Community Chest, and the Community Association. Aside from his Boy and Girl Scout activities, he is at present trustee of Ricker College and a director of the Electric Council of New England.

Takes Over Thriving Utility

Turning to his own company, Stet has this to say:

"We have done a terrific job over the past ten years. We have quadrupled our generating capacity and practically completed our rural electrification program. All these advances have brought the greatest improvement in living standards of the century to our customers, i.e. 'electrical living.'

"And yet we do not talk enough about it and our customers are too apt to take these factors for granted. We must do a better job of publicity. We must use every method to tell our customers what has been accomplished and what will be accomplished to improve their service.

"Last, we must keep our employees better informed of our problems and plans. With loyal, well-informed employees, anxious to render the best service possible, we will have a profitable growth in the use of electricity by our customers and will be better able to keep our stockholders happy by providing them a fair return on their investment."

GIANT RUBBER BALLOON, pumped hard with air, is buried in ditch. Concrete is poured over it and allowed to set

Pipelines: How They're Built in Italy

"Cucumbers" are helping Italian utilities put electric cables, water and gas mains underground more economically in large towns.

The "cucumbers" are big rubber balloons of various lengths and diameters. They are pumped hard with air and are buried in the pipeline ditch. Concrete is poured around them and is allowed to set. Then the balloons are deflated and pulled out. The remaining tunnels form the pipeline. The Italians report this technique costs less than when pipelines are built using prefabricated pipes.

The above picture contrasts the size of a large "cucumber" to the size of the men handling it. The lower picture, taken in Genoa, contrasts the old and new method of running pipelines. The new "tunnel" of thick concrete at right has been made using a "cucumber."

AFTER CONCRETE HARDENS, the "cucumber" is deflated and pulled out. Electric cables and water mains are then laid

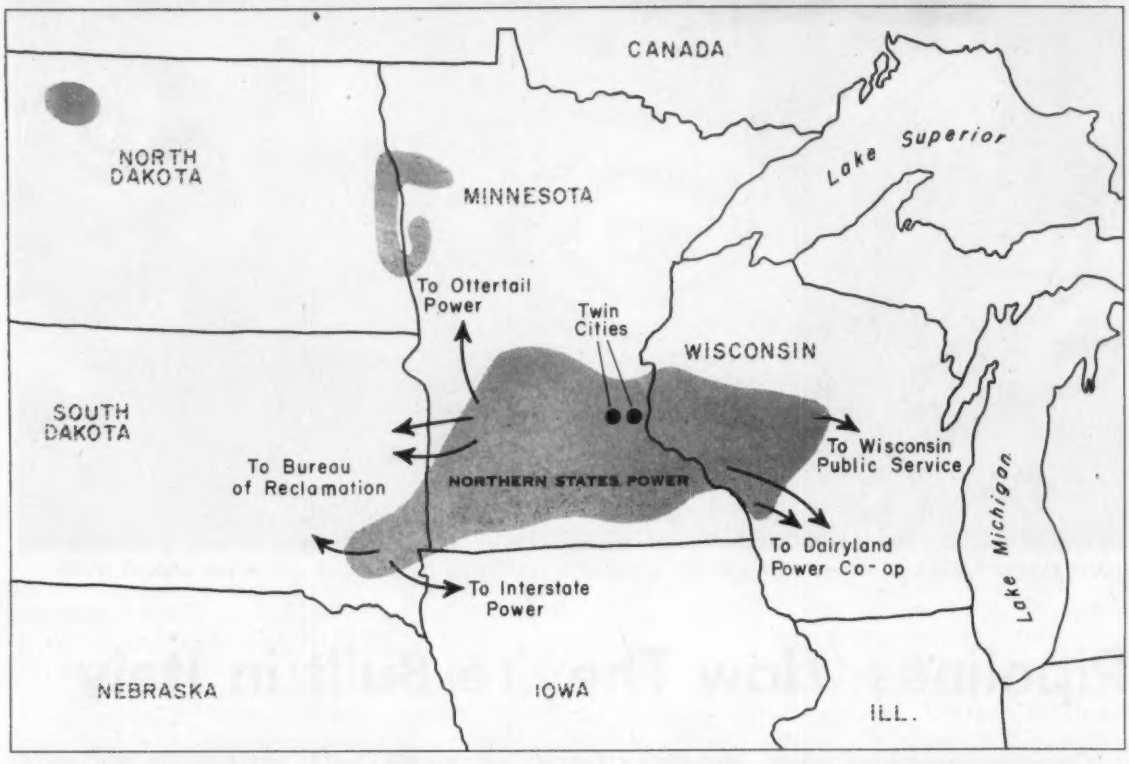


FIG 1—NSP SET UP area control of its 50,000-sq mi system and nine interconnected systems by automatically balancing area generation against load. Control of generation is given, within broad limits, to system dispatcher at Minneapolis

Automatic Controls Aid Area Loading

After two years operating experience with automatic load-frequency control equipment, Northern States Power attests to its many advantages over manual control of generation

E. C. GLASS, Assistant Superintendent of System Operation, Northern States Power Co, Minneapolis, Minn.

Northern States Power Co purchased automatic load-frequency control equipment two years ago out of necessity, not choice. This equipment has proved to have several advantages over manual control:

- NSP has established area control of its own and nine interconnected systems by balancing area generation against area load.
- All controlled generators act simultaneously, and duty on each unit is less rigorous.
- Because of constant monitoring, the system adheres more closely to the economic loading schedule. Also, various operating personnel are relieved of certain routine responsibilities.
- Better control is maintained in emergencies than would otherwise be possible with the minimized organization of the modern steam plant. And control of generation, within broad limits, is placed in the system dispatcher's hands, where it can be fitted into system operation.

The automatic control equipment was placed in service in August 1955 at NSP's system dispatcher's office in Minneapolis and at three steam plants in the Twin Cities area. Before then, the 2,000-Mw combined capacity of NSP and nine interconnected utilities was controlled manually. NSP maintained frequency, and the other systems the tie-line loadings.

NSP's service area covers 50,000 sq miles (Fig 1). Maximum load in 1956 was 1,171 Mw; present generating capability approximates 1,500 Mw, of which 2% is diesel, 10% hydro, and 88% steam. The transmission system consists of 3,000 miles of 69-kv line, 1,000 miles of 115 kv, 60 miles of 161 kv, and 115 miles of 230 kv.

Because there is no single important or widely fluctuating load on its system, NSP installed automatic load control equipment that acts only on sustained changes. Measured power flow on various interconnections is transmitted to the system dispatching office by high-speed, variable-frequency telemetering.

At the dispatch center, net interchange of power on interconnections is compared with scheduled interchange. The difference, the area requirement, is then computed, taking into account any deviation from scheduled frequency.

The area requirement figure indicates the governor adjustment necessary for area generation to equal area load at the scheduled frequency. The governor is adjusted by dc impulses sent to various controlled stations. These impulses are initiated by and proportional to area requirements. In addition to this tie-line bias operation, the controls provide flat tie-line or flat frequency operation.

Generation is adjusted by simultaneous action on all controlled generators according to their incremental cost characteristics. These characteristics are inserted into the control in the dispatch center.

Mechanics of this operation involve inserting as a base point for each station a generation value corresponding to a selected incremental cost. These base points, together with percentage participation of each station in generation changes above or below selected incremental cost, comprise the intelligence required by the control to determine routing of the control impulses.

A normal assist action allows loading of generators to deviate from economy loading by a pre-set value if area requirement exceeds another pre-set value. In effect, these values define the tolerance permitted in economy loading to hold interchange deviation within the normal assist setting.

An emergency assist action allows economy loading to be by-passed completely if the area requirement exceeds the pre-set value defined as an emergency condition.

Twelve steam units in three plants are now under control. The units vary in capacity from 38 to 117 Mw, and their gross capability is above 800 Mw. Two plants have units paired on common headers. Consoles similar to that installed in the dispatching office were installed at these plants to divide properly the load on the two generators in each group.

Intelligence is transmitted by dc potential, dc impulses, and variable frequency over distances of 5 to 200 miles. Power line carrier, company-owned telephone circuits, and leased commercial telemetering channels are used. Most long hauls are by power line carrier.

Several classes were held for the system operating and dispatching staffs to provide the background for intelligent use of the Leeds & Northrup equipment. This training has demonstrated its value in routine operations. It has helped personnel detect errors in operation and determine whether they were caused by system, telemetering, or control equipment, or by the operator.

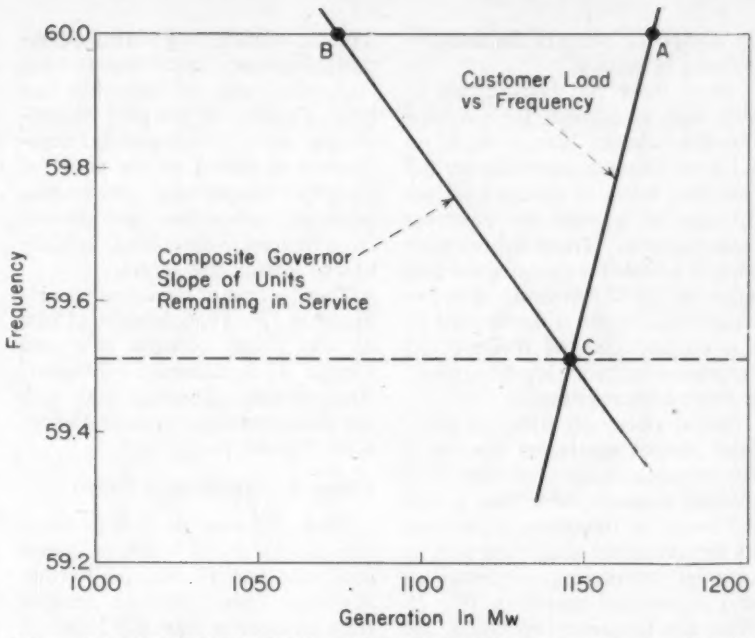


FIG 2—BIAS WAS CALCULATED from data obtained from several system disturbances. Customer load was plotted against frequency, line A-C; composite governor slope of units still in service, line B-C, was plotted to determine the bias

On installation of the control equipment, there was not in common use a definition of bias which was complete, concise, and easily understood. Furthermore, there was disagreement as to what bias was to accomplish.

How to Define Bias?

Bias was therefore defined as representing the reaction of an interconnected system to a frequency change. This is the composite reaction of governors, customer load, changes in line loss, and other system factors. These reactions result in a surplus or deficit of generation, depending on whether frequency is low or high.

The ratio of this surplus or deficit to frequency change is inserted as bias into the load-frequency control. The control then continuously compares actual system reaction with the reaction expected when governors are correctly adjusted to customer load. The control thus determines the generation change necessary to effect correct governor adjustment.

An appropriate bias value for the NSP system was calculated from data obtained from several system disturbances, such as the instantaneous loss of a 110-Mw generator. This unit was lost, coincidentally, the day the new control was placed in service. Because NSP was interconnected with other companies at the time, these data relate to the entire group (Fig 2).

Just before the disturbance the spinning capability was 1,480 Mw, total generated load (Point A on Fig 2) was 1,170 Mw, load on the unit lost was 95 Mw, and frequency was 60.00 cps. Point B represents the load, prior to the disturbance, on the generators which remained in service. Immediately after loss of the generator, frequency dropped to 59.51 cps.

Fig 2 is based on a customer load change varying linearly with frequency change in a ratio of 2.5 to 1—an approximate relationship that has been shown on some systems. Then, neglecting several less significant factors, a line drawn with this slope from point A intersects the 59.51-cps line at the new customer load, point C. Assuming a linear composite governor droop curve, a line from point B to C represents

the composite curve of the units remaining in service.

From these two lines it can be seen that, to account for governor reaction, correct bias is equal to 1.1% of spinning capability per 0.1 cps; plus 0.4% of system load per 0.1 cps, to account for customer load reaction. These figures were used as a basis for choosing the bias value on the NSP system. A somewhat higher value is determined by this method than by dividing lost generation by frequency drop, which is only an approximation.

Initial operation with automatic load control equipment was on a flat frequency basis. Compared with manual control, there was a real difference in frequency maintained by the automatic equipment with its constant monitoring of frequency and adjusting of generation (Fig 3). With flat frequency operation, the frequency is not a function of any inadvertent interchange.

When Interstate Power Co and Dairyland Power Cooperative installed automatic load control equipment, bias was introduced so that each system was operated on tie-line bias. Capacity of this pool was relatively small. Consequently, experience was gained on the need for error-free dispatching procedures, involving scheduling to prevent large frequency deviations, in addition to interchange errors.

Today's type of operation was initiated in July 1956, when a 115-kv tie was closed between NSP and Bureau of Reclamation's Missouri River system. This tied NSP with the Interconnected Systems Group, a 50,000-Mw pool.

Power Tie Oscillates 10 Mw

With this new tie it was found that natural band width of power oscillation was 10 Mw. A further deviation from schedule resulted from changes in customer load. In the past, a load change was partially compensated for temporarily by a corresponding frequency change.

But with the new tie practically the entire load change appeared immediately on the single interconnection with Reclamation because of the large rolling inertia of Interconnected Systems generators. Passing this on to NSP's neighbors was objectionable. Therefore, response of various generators was changed from original settings.

Rate of response was increased by adjusting the response of the governor motor to impulses generated by a separate impulse generator. The impulse generator simulated action of the master controller with impulses which matched the maximum length of impulse routed to each station from the master controller. This prevented taking the master controller out for this work.

The new maximum rate of response averages 12 Mw per min for each unit, except one set for 8 Mw per minute. This limitation was necessary because the boiler is served by bowl-type pulverizers having no appreciable coal reserve.

Protection of each unit from a

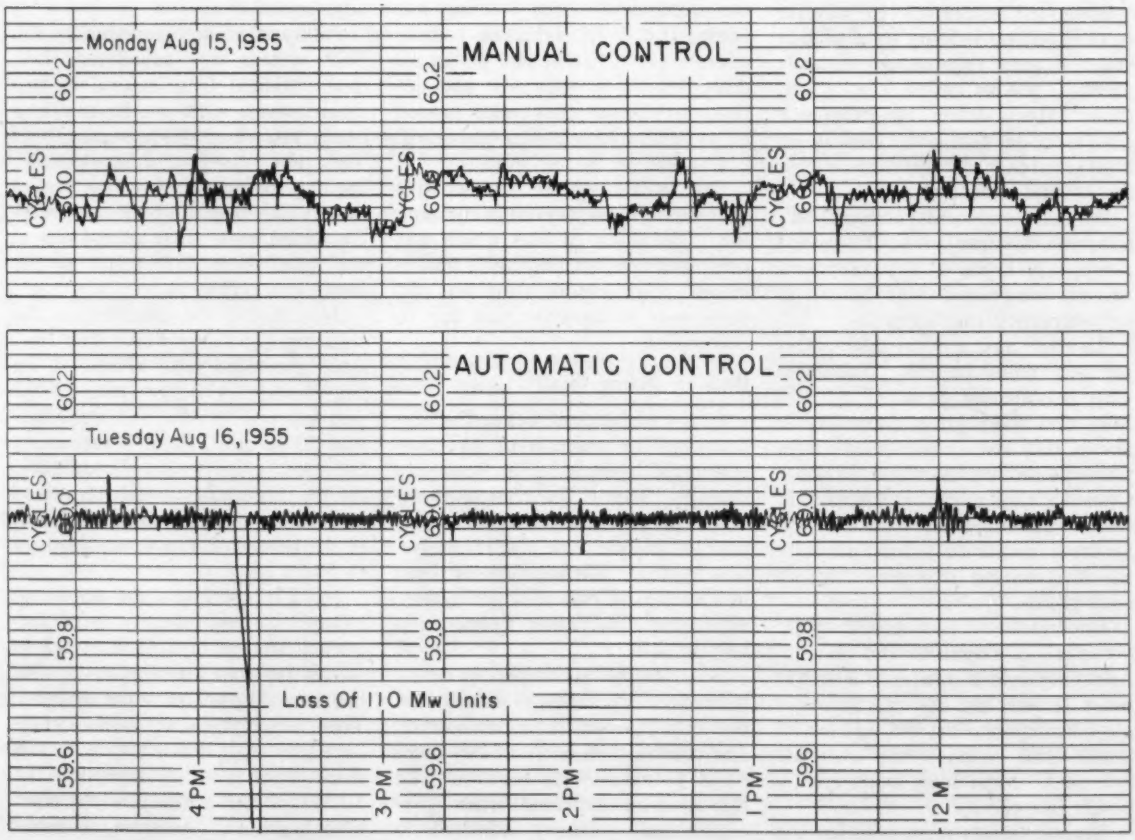


FIG 3—COMPARISON SHOWS difference in frequency maintained by automatic equipment which constantly monitors frequency and adjusts generation. Coincidentally, a 110-Mw unit was lost on the first day under automatic control

sustained change at these rates is taken care of at the station. There, both maximum and minimum limits are set into the control. These limits are based on capability of the unit, limitations of firing equipment in service, effect on boiler water levels, and other limitations encountered in usual operation.

Present total maximum rate of response varies between 50 and 100 Mw per minute, depending on the complement of machines and their load condition. A load change of 100 to 200 Mw can be accommodated without changing the firing equipment or adjusting the limits on the load-frequency control or governors.

The increase in response shortened the time needed to eliminate sustained load changes from the tie with Reclamation. The cyclic swing of 10-Mw band width remained unchanged. It is anticipated, however, that closure of the interconnection with Wisconsin Public Service Corp and closure of two additional ties with Reclamation will greatly decrease the band width of the power swing on this one tie. These closures are also expected to lower the band width of the net power swing with Interconnected Systems.

Some Cases of Trouble

With the new equipment in service, there were cases of trouble. Some caused a legitimate area requirement which took care of the situation. Others, because of erroneous intelligence, caused a false requirement which resulted in undesired generation changes.

Because of these troubles, a continuous type of alarm was added to the controls. It sounds when the emergency assist limit is exceeded on the area requirement meter.

Sounding of the alarm allows time to decide whether the system is in trouble and is being properly cared for or whether some erroneous intelligence has been received and should be disregarded. The latter has become rare.

Importance of the load control equipment means that its maintenance must be of highest quality. Preventive maintenance on a routine basis reduces emergency maintenance to a minimum and assures proper functioning of equipment.

Maintenance of all automatic load control equipment at all locations is handled by one department at NSP. One team of specialists keeps a detailed maintenance record of diagnosis and repair.

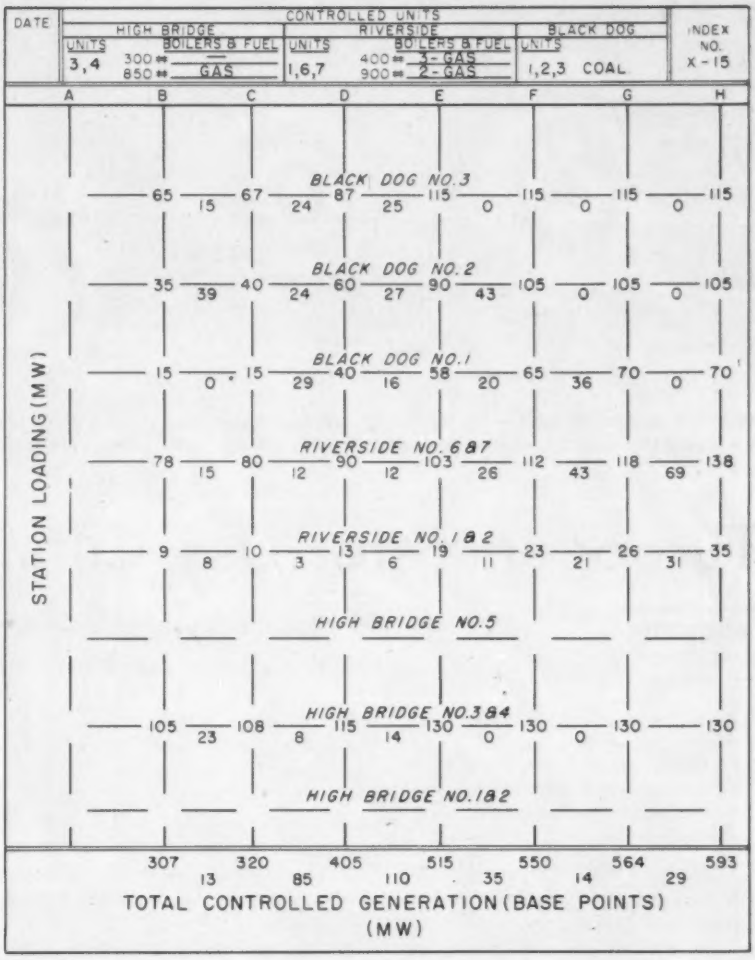

DATE
CONTROLLED UNITS
HIGH BRIDGE
UNITS 3,4
BOILERS & FUEL
300 = —
850 = GAS
RIVERSIDE
UNITS 1,6,7
BOILERS & FUEL
400 = 3-GAS
900 = 2-GAS
BLACK DOG
UNITS 1,2,3 COAL
INDEX NO. X-15
A B C D E F G H
BLACK DOG NO.3
65 15 67 24 87 25 115 0 115 0 115 0 115
BLACK DOG NO.2
35 39 40 24 60 27 90 43 105 0 105 0 105
BLACK DOG NO.1
15 0 15 29 40 16 58 20 65 36 70 0 70
RIVERSIDE NO.687
78 15 80 12 90 12 103 26 112 43 118 69 138
RIVERSIDE NO.182
9 8 10 3 13 6 19 11 23 21 26 31 35
HIGH BRIDGE NO.5
HIGH BRIDGE NO.384
105 23 108 8 115 14 130 0 130 0 130 130
HIGH BRIDGE NO.182
STATION LOADING (MW)
307 13 320 85 405 110 515 35 550 14 564 29 593
TOTAL CONTROLLED GENERATION (BASE POINTS)
(MW)

FIG 4—TO REDUCE WORK this form was adopted to make adjustments on setters of Northern States Power's new automatic load-frequency control equipment

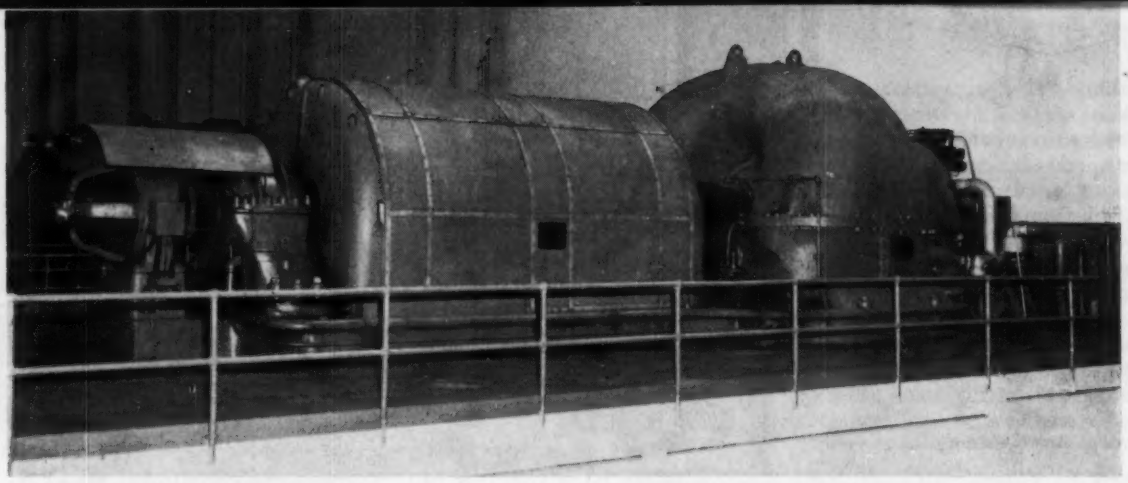
Economic loading of NSP generators has included for many years the use of a load allocation board based on incremental heat data. For steam plants outside the Twin Cities area, line loss is accounted for on a pre-determined basis.

Economic loading information for the controls is taken from this allocation board. Information required for each station consists of a base point setting in Mw and a below-base and above-base percentage participation setting. These values are determined and the setters are adjusted by the system dispatcher. This effectively sets in two straight lines the segments of the economy loading curve for each station.

In addition to indicating pertinent data, this process initially included graphical representation of the segmental curves for each complement of units on control. To reduce work, a form (Fig 4) was adopted which was easily followed in adjusting the necessary setters.

On this form the vertical lines lettered A, B, C, to H represent selected incremental costs. Base points for various stations are indicated along these lines. Total of the base points for each incremental cost is noted at the bottom.

The difference between two adjacent base points for a given station, divided by the difference between the corresponding base point totals, indicates the participation percentage. This figure is shown on either side of each base point. Then A-B, B-C, C-D, as such, represent straight line segments of the incremental loading curve for each station.



TWO OLD MACHINES both rated 25 Mw at 1,800 rpm are being used to supply 50 Mvar of reactive power for voltage regulation. Very few modifications were required to allow the turbogenerators to run as synchronous condensers

Turbogenerator Use Cuts Costs

GENERATION
Operation

30-year machines, used as synchronous condensers, supply reactive power for heavy-load area voltage regulation

K. D. BUCK, Engineer, Production Engineering Department,

C. H. DIDRIKSEN, Engineer, System Planning Engineering Department, Cleveland Electric Illuminating Co, Cleveland, Ohio

More than $100,000 in fuel cost will be saved by Cleveland Electric Illuminating Co this year by operating two 30-year-old turbogenerators as synchronous condensers.

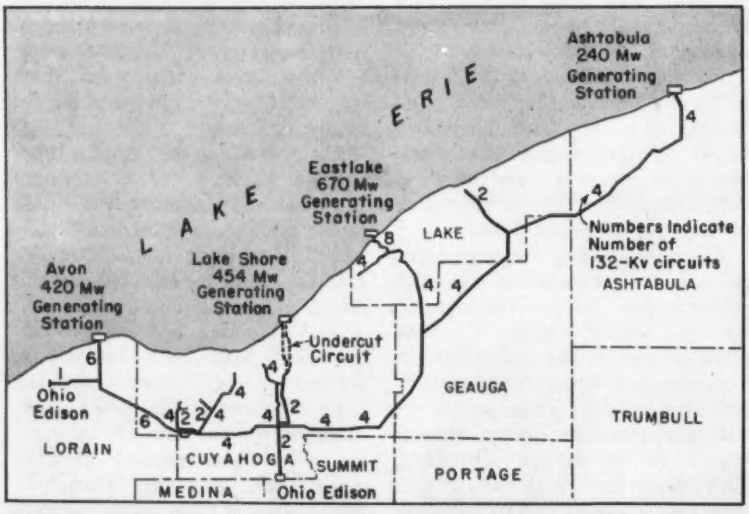
The Lake Shore station where these machines are housed is in a heavy-load area near downtown Cleveland. It is tied into the 132-kv system by 66-kv cables. A sizable local load is supplied at 11 kv directly from the plant. This load requires close regulation of voltage at the plant to meet customer requirements.

It was not possible to bring in enough reactive power generated at other plants to regulate voltage in the Lake Shore area. Hence it was necessary to generate reactive power with one or more of the oldest of the system's turbogenerators at Lake Shore "B" plant, Units 10 to 13, each carrying a minimum load of 10 Mw.

Operating two of these turbogenerators as synchronous condensers would permit generating the reactive power to regulate the 11-kv buses, while the watt load normally carried can be generated by other units of a much better heat rate. But before addition of Eastlake No. 4 unit, it was necessary to run several Lake Shore "B" turbogenerators on week days for spinning reserve. The generation of reactive power by the same machines was then accomplished at the slight additional cost of somewhat increased generator heat losses.

With the addition of Eastlake No. 4 unit in 1956, it was no longer necessary to operate these older turbogenerators for spinning reserve. Two were modified so that their generators now operate as synchronous condensers.

Each is a 25-Mw, 1,800-rpm machine, capable of supplying 25 Mvar reactive power. Because of location, two methods of synchronous condenser operation were adopted, that is, with and without the generator coupled to the turbine.



MACHINES USED FOR synchronous condensers are located at Lake Shore station in a heavy-load area. Local distribution at 11 kv needs close voltage control

No. 10 is operated with the generator uncoupled from the turbine; No. 11 with the generator coupled. They are expected to be in use for slightly longer than a year, until additional cable capacity on the system relieves the voltage problem in the Lake Shore area.

In evaluating the operation of these turbogenerators as synchronous condensers, various factors were considered:

1. Possible need for the unit's watt-generating capacity on short notice.

2. Net savings from the change in operation.

3. Daily hours of synchronous condenser operation.

4. Methods of starting.

5. Operation of necessary auxiliaries.

6. Bearing lubrication.

7. Generator thrust bearing.

8. Changes in instrumentation.

9. Switching and relaying problems.

10. Operating manpower.

Auxiliaries Eliminated

Uncoupling the turbine from the generator eliminates the need for turbine auxiliaries. This saves $13 per hr in fuel. Yet four problems arise:

1. Watt capacity of the turbogenerator is not readily available.

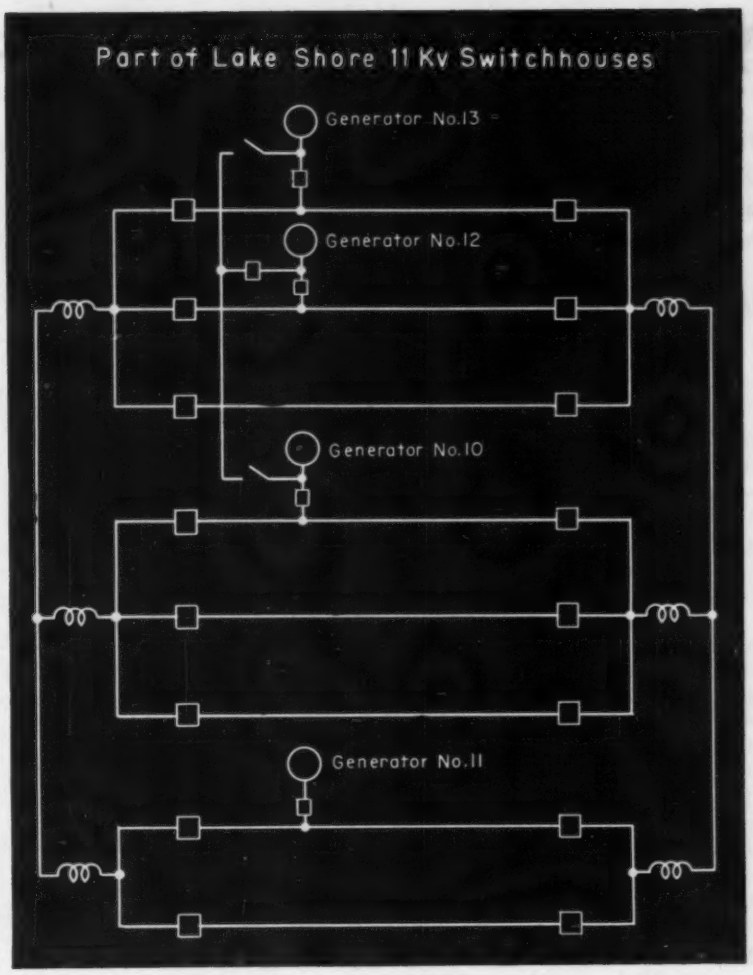
2. Generator must be started electrically.

3. Generator must be provided with a thrust bearing, as the normal thrust bearing for the entire unit is on the head end of the turbine shaft.

4. Normal lubricating oil supply is cut off, as the main pump is also on the head end of the turbine shaft.

No. 10 generator, prepared for this type of service, was built with a thrust bearing on both the generator and the turbine. As it is the policy of the company to provide two separate oil pumps, each with a different source of power, an ac motor pump was installed to substitute for the turbine shaft-driven pump. It supplies 125 gpm of oil at 18 psig to the generator bearings only.

The installed steam-driven, emergency oil pump continues in use as the emergency oil pump, starting automatically when the oil pressure drops 10%. With a further drop in oil pressure, an alarm will alert the electrical operator to stop the machine. Steam will be available for the emergency pump whenever the synchronous condenser is in operation. But a plan to install a battery-operated emergency oil pump to dispense with steam is under study.



GENERATORS NOS. 10 AND 11 are run as synchronous condensers. Either generator No. 12 or 13 can start No. 10. Generator No. 11 is started with steam

Starting the uncoupled synchronous condenser proved to be easier than expected. Because the exciter on the generator shaft is not large enough to supply the necessary 15,000 ft-lb breakaway torque, the synchronous condenser is started by another turbogenerator in the plant. Both generators start from rest. They are connected by means of the switch house transfer bus. Both fields must be energized before the driving machine starts to roll. A separate motor-driven exciter supplies the fields of these two machines.

When the driving machine starts to roll, the rotor of the synchronous condenser may turn backward ¼ revolution or less before starting in the proper direction. Generally the two machines are in synchronism within 3 sec. During this 3-sec interval, some fairly sizable oscillations in armature current are indicated on the generator ammeters. This current is not serious. When the two machines are up to rated speed, the synchronous condenser field is switched over to its shaft-driven exciter and phased into the system. The driving machine is then free to be phased into the system or to be shut down.

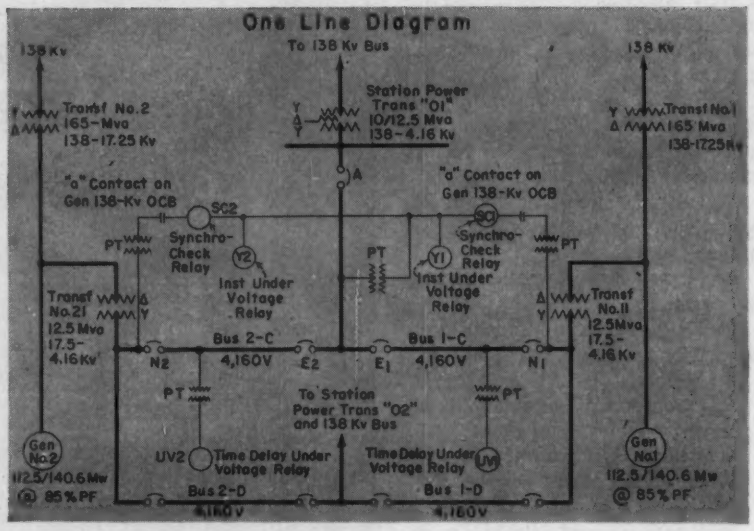
Power input to this type of synchronous condenser is about 500 kw, as measured readily by the generator

(*Continued on page* 134)

Transfer Scheme Simple, Flexible

Automatic transfer of station auxiliaries can be accomplished with least attention from operator

LEROY E. SMITH, Electrical System Design Engineer, Toledo Edison Co, Toledo, Ohio



LIVE TRANSFER OF POWER FOR AUXILIARIES is provided by specially designed scheme serving two generating units and their respective station power buses

The auxiliary power transfer circuit at Toledo Edison's Bay Shore station is a simple, flexible method of assuring power to necessary auxiliaries. Its automatic features require minimum operator attention.

The scheme has the following desirable features:

1. Live transfer can be under normal operating conditions.

2. Dead transfer can be made under adverse operating conditions.

3. Automatic dead transfer from normal to emergency source is made upon closure of generator differential relays or loss of voltage.

4. On dead transfer, slow closing of the incoming line breaker allows time for residual voltage on the bus to decay.

5. Controls are under one (plant) operator for expeditious handling of emergencies.

6. Simple means, such as indicating lights, tell operator when a live transfer can or cannot be made.

7. Generator No. 2 can be used as a starting source for Generator No. 1, or vice versa, in case of a "start-up" transformer failure.

As indicated in the one-line diagram the first two units at the station have two auxiliary buses each. Each generator supplies the normal power for its auxiliary buses through a step-down transformer. Transfer to an alternate supply is accomplished with the breakers identified on buses 1-C and 2-C as N1, E1, E2, N2. Corresponding breakers serve buses 1-D and 2-D.

With two sources of station power, one from the generator leads and one from the station bus, the scheme provides for live transfer from one source to the other during the startup or stopping periods of the turbo-generator. Live transfer is desirable for large motors because it can be made with minimum disturbance as it eliminates shock to motors, couplings, and other equipment.

The operator can make a dead transfer under adverse operating conditions, but a live transfer, when the two systems are out of synchronism, is blocked automatically.

Restores Auxiliaries Rapidly

Upon loss of bus voltage, automatic transfer restores power to the station auxiliaries as rapidly as possible. Automatic transfer is initiated by bus voltage and delayed slightly to avoid unnecessary transfers, such as for quickly cleared faults on the station power system.

The transfer is made within 5 sec to maintain proper functioning of the boiler auxiliaries and the boiler. When the automatic transfer is not completed within approximately 10 sec, the bus remains dead to prevent damage to plant equipment.

Design of the auxiliary power switchgear provides for the necessary relaying as well as control. Each motor or radial circuit is equipped with instantaneous relays to protect against short circuits and with overload relays to trip the breakers for locked-rotor currents or excessive overloads. Protection for nominal overloads is provided by relays that sound an alarm.

Incoming line breakers have overload relays to protect against bus faults and to back up a feeder breaker which fails to trip. Overload relays on the incoming line breakers block the automatic transfer to prevent closing in another source on a bus fault. As this is a resistor-grounded, 4160-v system, ground relays were also installed. When the generator differential relays function and it is evident that the station power buses will lose their source, the automatic transfer can be initiated immediately.

Much consideration was given to residual voltage on the bus from induction motor feedback. This is a real problem in a dead transfer.

Normally there would be a voltage relay on the bus to block closing of the incoming breaker until the voltage on the bus has decayed to a predetermined value. Tests and oscillographs taken on other auxiliary motors of similar characteristics indicated that a delay of approximately 50 cycles of dead-bus time would permit the residual voltage to drop to a safe value. Accordingly, a timing relay in the closing circuit of each incoming line breaker provides this necessary delay.

Incorporation of the timing relay was considered simpler than adding the voltage relay to the bus and

using it to block closing of the incoming line breaker. On earlier installations 50-cycle delay was obtained by a capacitor and resistor across the breaker closing relay coil.

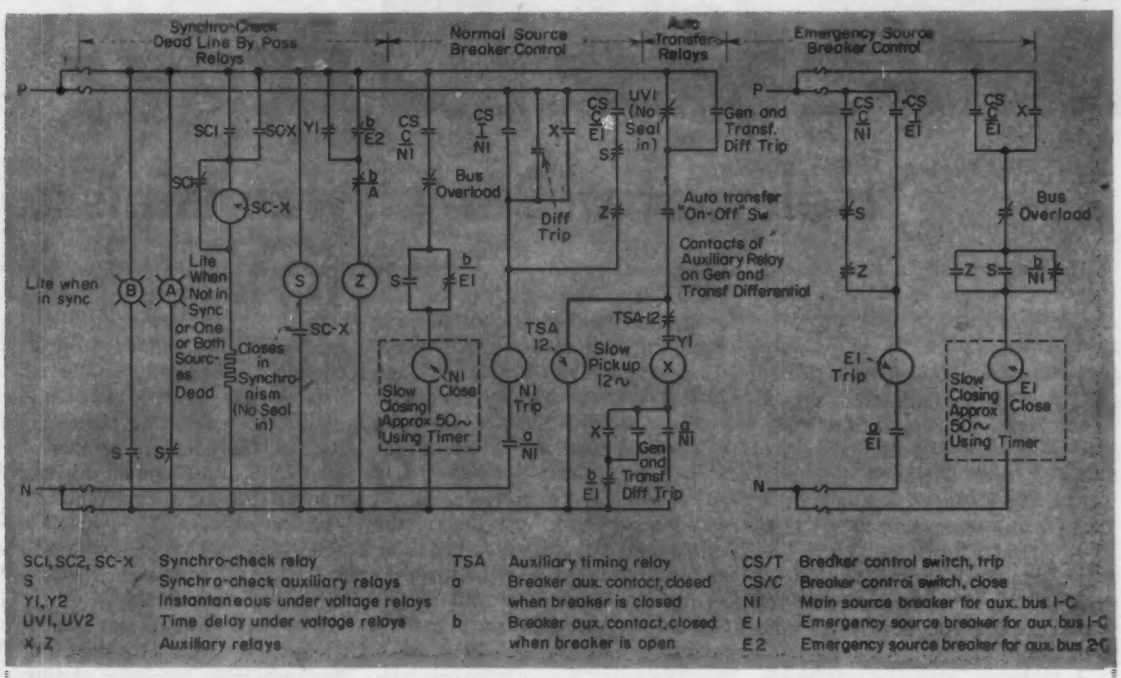
All controls for station auxiliaries, installed in the plant control room, are operated by the plant or mechanical operator. An indicating light tells the operator when the two systems are in synchronism so that he can make a live transfer. Another indicating light shows when the systems are out of synchronism. In the latter condition the operator must make a dead transfer if he desires to change from one power source to another.

The operator has only one control switch with red and green lights for each circuit breaker and an "auto-transfer on-off" switch to operate each bus. Voltmeters indicate bus voltage. The number of control devices with which the operator must contend were kept to an absolute minimum.

While the transfer scheme has all these desired features, it is comparatively simple. The schematic diagram is straightforward and without complexities. The equipment's functioning is almost foolproof and was designed to give the operator a clear and quick understanding of the status of his station power.

The automatic transfer has performed properly, once when the machine was tripped by transformer differential and again when the machine was inadvertently tripped by low bearing oil pressure.

Here are details of the transfer scheme:



SC1, SC2, SC-X	Synchro-check relay	TSA	Auxiliary timing relay	CS/T	Breaker control switch, trip
S	Synchro-check auxiliary relays	a	Breaker aux. contact, closed when breaker is closed	CS/C	Breaker control switch, close
Y1, Y2	Instantaneous under voltage relays			N1	Main source breaker for aux. bus 1-C
UV1, UV2	Time delay under voltage relays	b	Breaker aux. contact, closed when breaker is open	E1	Emergency source breaker for aux. bus 1-C
X, Z	Auxiliary relays			E2	Emergency source breaker for aux. bus 2-C

When both "bus" and "generator" sources are alive and in synchronism the synchro-check relay (SC) closes its contact, picking up auxiliary relay "S" which permits closing both breakers and making a live transfer. When the sources are not in synchronism, S relay will not be picked up and dead transfer must be made by opening the normally closed breaker and then closing the breaker that is open. A seal-in relay (SC-x) with its coil shunted by a back contact on the synchro-check relay was used to prevent excessive burning of the SC contact while the SC contact carries current continuously.

Auxiliary contacts on generator OCB's permit the synchro-check relay to function only when the generators are tied to the system 138-kv bus and thus prevent tying the generators to the system through auxiliary buses with the consequent overloading of the auxiliary and station service transformers.

If both A and E2 breakers are open or if A is open and Y relay is down indicating that E source is dead, Z auxiliary relay will pick up and permit closing E1 without tripping N1, even though the synchro-check relay contact is not closed. This permits feeding one generator's auxiliaries from the other generator.

Control circuits for N1 and E1 breakers are conventional except that a contact on the control switch for N1 will trip E1 when the switch is in the close position and vice versa. Also, a timing relay is added to the closing circuits to delay closing about 50 cycles.

If bus 1-C is alive from generator source with E1 open and the bus goes dead, voltage relay UV1 will time out and close its contacts. With the "auto-transfer" switch in the "on" position and the emergency source alive, X relay will pick up and trip N1 and close E1 thus giving an automatic dead transfer. This transfer will occur also when generator or transformer differential relays operate.

If bus 1-C is dead for maintenance with both N1 and E1 open and the "auto-transfer" switch is inadvertently left in the "on" position and N1 is closed for test, X relay is prevented from picking up by TSA relay which opens up the coil of X relay some 10 sec after 1-C is dead.

This feature also prevents making an unwanted automatic transfer when bus 1-C goes dead and souce E1 is dead and then E1 source becomes alive after a time delay. If the transfer is not made within 10 sec, it becomes inoperative.

NORMAL MONTHLY PATROL by air is far faster and costs less than foot patrol. Helicopter can land on right-of-way to allow observer to make climbing inspection of line if necessary

Helicopter Patrols Transmission

J. M. VAN NAME, Associate Senior Engineer, Transmission & Distribution Dept, Philadelphia Electric Co, Philadelphia

Helicopter patrol of transmission circuits 33 kv and above has proved economical and effective for Philadelphia Electric Co. Based on six-months' trial operation of aerial patrol of 440 miles of lines, these comparisons were made:

1. Aerial patrol is far faster and less expensive than ground patrol.

2. Two trained linemen are released almost 100% of their time for other duties.

3. A better inspection of circuits is made.

4. In an emergency, a line may be patrolled rapidly, and limited amounts of repair material carried quickly to the trouble site.

The 440 line-miles patrolled by helicopter comprise single and double-circuit lines from 33 to 220 kv on either steel towers or wood-pole structures. The 66-kv and higher voltage lines extend through the city of Philadelphia, three surrounding counties, and a small section of Maryland. About 20% of the aerially inspected lines are within city limits, and there is a projected increase of 100 line-miles by 1960.

About 50% of the lines within city limits are on electrified railroad structures or beside non-electrified trackage. Of the lines to be built by 1960, 90 line-miles will be on railroad structures. The suburban area lines extend through urban areas, such as the City of Chester, and rural farm land. The longest of these is the 58-mile, 220-kv line from Conowingo to Plymouth Meeting.

To patrol these lines effectively and economically from the air, it was necessary to investigate both the availability and cost aspects of using aircraft. The plan was conceived as a combined effort along with utilities adjacent to Philadelphia Electric's system to justify a helicopter on a monthly basis. The other companies patrol bi-monthly, using light airplanes, so that the original plan did not materialize.

Costs $70 per Flight-Hr

An agreement was made with the Keystone Helicopter Co in Philadelphia to rent a helicopter, including pilot, on an hourly basis. Cost of the service is $70 per flight-hr on a weekly contract. This rate applies to routine as well as emergency flights and includes ferrying time and liability insurance.

The transmission system is scheduled for patrol once a month. The air patrol is completed in 14 to 15 flight-hr over a four-day period, a company patrolman riding along as observer. In contrast, ground patrol required 37 man-days, or an average of two men on constant patrol. At standard company man-hr rates, the foot patrol cost about $1,400, including transportation. The aerial patrol costs $1,200, a saving of $200. Moreover, one patrolman is released full time and another more than 75% of his time for duties with transmission crews and other work. With an expected 50% increase in aerial transmission lines within three years, use of a helicopter will save manpower considerably.

The first patrol was made in August, 1956, and a regular monthly program now has been instituted. The aircraft used is a Bell 47-G, three-place helicopter, with a 500-lb lifting capacity. It is brought from its home base at Philadelphia International Airport to the company's Plymouth service building to pick up the patrolman-observer. Initially, 20 flight-hr were required to cover the entire system, but improved scheduling has reduced flight time to about 15 hr per month.

Operating experience with helicopter patrol has resulted in several conclusions about the methods used. An observer in the air can spot additional cases of trouble, such as broken strands, signs of flashover, etc, which are not visible from the ground. Naked-eye observation is preferred over inspection through

EMERGENCY FLIGHT by helicopter brings supervisor and needed spare material to the trouble spot in a very short time. Helicopter can carry payload of 500 lb to any point on system

Lines Effectively, Economically

binoculars because of vibration. On occasion, however, the observer may use spectacle-type binoculars for a detailed view of trouble.

It was found impossible for the observer to record manually these trouble spots as the line was patrolled, because of the speed of the aircraft. The observer now uses a portable, battery-powered tape recorder. The report is transcribed after the flight to standard patrol sheets. Because the noise during flight sometimes interferes with proper transcribing from the tape, some thought has been given to the use of a throat-microphone by the observer. Enough additional cases of trouble are found each month to justify continued patrol on a monthly schedule. A semiannual ground patrol should supplement air patrol.

Cloudy days have been found to be more satisfactory for observation than bright, sunny days. Patrolling is not normally scheduled for cloudy days, although certain types of lines may be selected for inspection on such days, if the choice may be made. Bright, sunny days offer too much contrast and reflections from insulators and other bright objects. These conditions tend to detract from an accurate inspection.

During the patrol, the helicopter normally cruises at 20 to 30 mph along wood poles lines with 400-ft spacing, and at 40 mph along steel tower lines with 1,000 to 1,200-ft spacing. Because of the layout of the Philadelphia Electric system, each circuit is patrolled individually. For the Conowingo-Plymouth Meeting double-circuit line, for example, one circuit is patrolled out and the other on the way back.

Identify Towers and Poles

To identify the structures to the observer, steel tower lines have the circuit number painted on the tower in 4-in.-high figures about 8 ft from the ground. Wood pole lines have a board placed on about every fifth pole, 10 ft below the conductor, on the side of the pole approached by the helicopter. Figures are 4 in. high, yellow on a black background.

Inspection of lines on railroad right-of-way is easier, and more detail can be observed at any given cruising speed. As the mileage of this type of construction increases, with its higher ground-patrol costs, there will not be the same percentage rise in cost of patrolling these lines. Lines in urban areas can be patrolled effectively by helicopter as long as there are no local ordinances restricting such flights. Aerial observation is effective on both steel and wood pole lines.

If necessary, the helicopter can land on company right-of-way in rural areas to allow the patrolman to make a climbing inspection, remove kites, etc. There are enough airports in the service area for gas stops. It is not unusual for the pilot to land his ship in the parking lot of a restaurant at meal time. During the third day of patrolling, which is scheduled to pass near the Philadelphia International Airport, a gas-meal stop is made and the ship is checked by a mechanic.

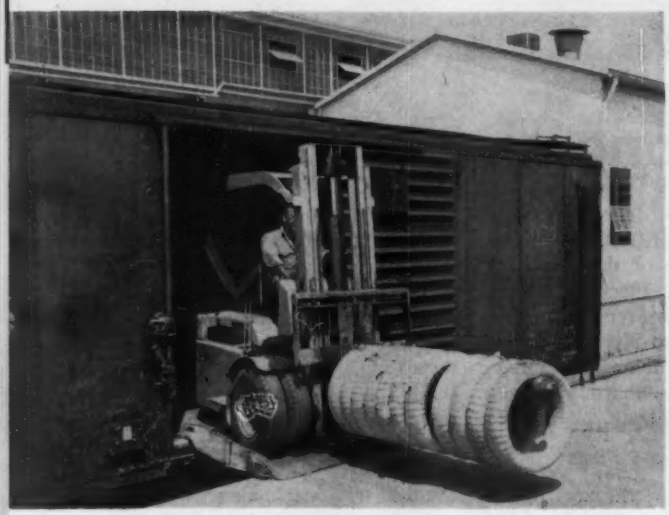
In an emergency, the helicopter company will make a patrol on short notice when the ship is available. This was done last Labor Day, when a 220-kv line tripped during a lightning storm. A complete inspection of the line was made in 3 hr, including ferry time. A ground patrol would have taken about 8 hr, had the men been available.

No special training was needed to equip the company observer for aerial patrol. An experienced patrol-groundman was selected and needed only one flight over the system to familiarize himself with the appearance from the air of lines he knew so well from the ground. The aerial patrol has brought no complaints from customers along the right-of-way. This is due principally to precautions taken in planning the flights so as to avoid areas, such as turkey farms, where a low-flying helicopter could arouse complaints.

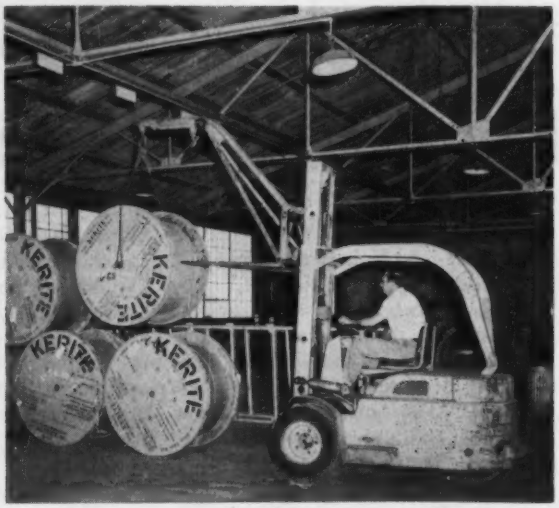
Mobile Equipment Speeds Jobs

Standard equipment is adapted to help move 51,000 tons of material annually at the general store of Southern Cal Edison Co

DUAL USE of 5-ton capacity gooseneck cranes permits safe handling of 2,500-kva transformer weighing 8 tons

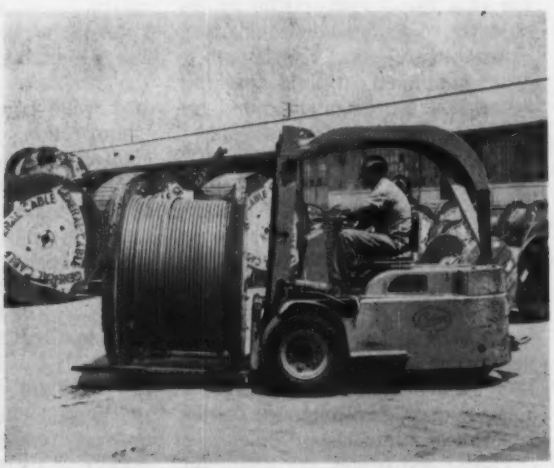


PIPE EXTENSION on fork lift cuts unloading time for 15 tons of coiled conductor from 40-80 man-hr to 8-10 man-hr



EXTENSION ARM on forks of lift truck speeds handling of reels. Full reels now may be stacked up to the ceiling level

UNITS of 50 crossarms tied with steel banding can be stacked higher and handled safely with mobile equipment



METAL SHOES extend blade ends and allow fork lift to carry reels which are too wide for standard blades

HOME BUILDING IN DALLAS BOOMS RESIDENTIAL LOAD

DISTRIBUTION TRENDS REPORT:

Dallas Power & Light meets challenge of air conditioning load growth

In the last ten years the City of Dallas has extended its city limits to encompass more than two and one-half times its previous area. And, according to forecasters, by 1960 Dallas will require seven times the electric power used a decade ago. In line with this trend, Dallas Power & Light Company's generating capacity rose from 118,000 kw in 1946 to 837,000 kw today, and will increase to 1,137,000 kw by 1960.

These few facts point up a spectacular load growth. The rapid increase of air conditioning load has added to the problem created by the extreme pace of this growth. Dallas P&L was faced with a rising cost of installing a kilowatt of distribution system capacity. This posed a problem for DP&L distribution planners.

MORE POWER TO AMERICA

GENERAL ELECTRIC

Here's how General Electric helped DP&L meet this challenge

DISTRIBUTION TRENDS REPORT:

Sound planning, move to 138 kv transmission, use of capacitors, and flexible substations enable DP&L to meet growth economically

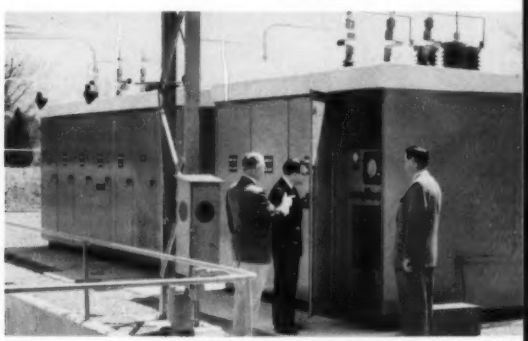
EFFICIENT CLUSTER MOUNTING of 24 G-E 25-kvar capacitors allows more capacitors on pole, contributes to DP&L's high ratio of kvars/kilowatts. Discussing capacitor performance are L. H. Cardwell, DP&L Operating Division Head and G-E Sales Engineer, B. T. Bain.

Dallas Power & Light first implemented a plan in 1937 that treated transmission and distribution integrally, allowing great flexibility for future growth. In recent years the problems of increasing seasonal load and higher construction and operation costs have added new importance to their transmission-distribution practices. Sound planning has enabled DP&L to minimize capital expenditures and operating costs while cultivating loads to improve load factor.

HOW THE PLAN WORKS:

Long Range Planning — Plans are projected in 10 to 15 year periods. DP&L considers generation, transmission and substation facilities for serving a load of three to four times that currently served. Actual load growth and other considerations require that long-range plans be reviewed periodically and revised to fit changing conditions. Flexibility and expansibility underlie all of Dallas Power & Light's programs to stay ahead of rising load.

HIGHER TRANSMISSION VOLTAGE — A large section of the 69 kv transmission ring encircling Dallas is now being converted to the more economical 138 kv. As new generating capacity and load require, the higher voltage will be used on the entire ring. Distribution voltage, except in the City's heart, has long been standardized at 13 kv, and a 13 kv overhead system now serves 93% of the service area.



FLEXIBILITY to meet load growth is provided by this all-General Electric substation, rated 25,000 kva, recently installed by DP&L. Examining it are (l.) DP&L's F. J. Zak, Senior Engr., and (r.) J. P. Barron, Div. Head, Substation and Transmission Engineering and G.E.'s B. T. Bain.

METER ACCURACY is essential to operating revenue. These General Electric single-phase, type I-55 watthour meters are factory certified for accuracy. V. P. Armour (r.), Meter Div. Head, and M. B. Donegan, Supvr. Meter Laboratory, both of DP&L, inspect an apartment house installation.

MORE KVARS — DP&L was one of the first utilities to recognize the importance of capacitors, and now the system has 356,000 kvar of capacitors or more than 0.5 kvar per kilowatt of demand. This is a much higher than average ratio of kvars to kilowatts, and DP&L relies heavily on General Electric capacitors for this favorable ratio. Other General Electric equipment employed includes distribution transformers, regulators, meters, lightning arresters, and streetlighting luminaires.

FLEXIBLE SUBSTATIONS — A basic substation is utilized and includes four 13-kv feeders, each with a normal capacity of 6250 kva. The station design allows expansion to an eight-feeder, 50,000-kva station. This has been adopted by DP&L planners as a basic building block for their distribution system over a wide range of load densities. General Electric engineers helped determine the substation relaying schemes.

When You Specify General Electric, you take advantage of the latest advances in apparatus design, construction, application, and the assistance of complete engineering services. To help utilities keep service running smoothly, highly trained General Electric service engineers plus a network of Service Shops stand ready to meet any and all maintenance and repair needs — day and night.

For Full Information on distribution equipment and Distribution System Services, contact your local General Electric Apparatus Sales Office. General Electric Company, Schenectady 5, N. Y.

LANDSCAPED SUBSTATION is good public relations. L. to r., DP&L's J. P. Barron, Div. Head, Substation and Transmission, and R. D. Elliott, Vice President and Consulting Engineer, discuss new substation layout with G.E.'s District Mgr. — Application Engineering, G. N. Pingree, and DP&L Chief Engr., E. W. Rogers.

NEW STREETLIGHTING for Dallas' Municipal Auditorium is provided by General Electric Form 406 fluorescent luminaires. Standing before the building (under construction) are J. W. Monk, Supervisor of Public Utilities, City of Dallas, and T. C. Winter, Asst. Commercial Manager, Dallas Power & Light Company.

MORE POWER TO AMERICA

GENERAL ELECTRIC

Here's why it pays to see General Electric about your distribution problems

DISTRIBUTION TRENDS REPORT:

Dallas P&L to help test experimental General Electric distribution transformers

Dallas Power & Light Company is one of several utilities that have recently agreed to install General Electric experimental distribution transformers. Through its willingness to try new designs and participate in co-operative testing, DP&L places itself in the ranks of utilities taking advantage of the most advanced designs originating with General Electric product development.

These new transformers represent a highly significant step forward toward reducing maintenance and increasing transformer life. They use molded transformer covers and molded transformer bushings. The molding material is an outgrowth of General Electric's development of molding materials resistant to arc tracking, first introduced by General Electric in the late nineteen forties for instrument transformers. Use of the new cover should reduce outages caused by squirrels and birds and, as it needs no painting, should keep factory-fresh indefinitely. This typifies the manner in which product development at General Electric strives to anticipate and meet tomorrow's operating needs — today.

When you specify General Electric, you get the result of General Electric Distribution System Services which include headquarters system planners — district application engineers and product specialists — extensive product development facilities — equipment installation and field service engineering.

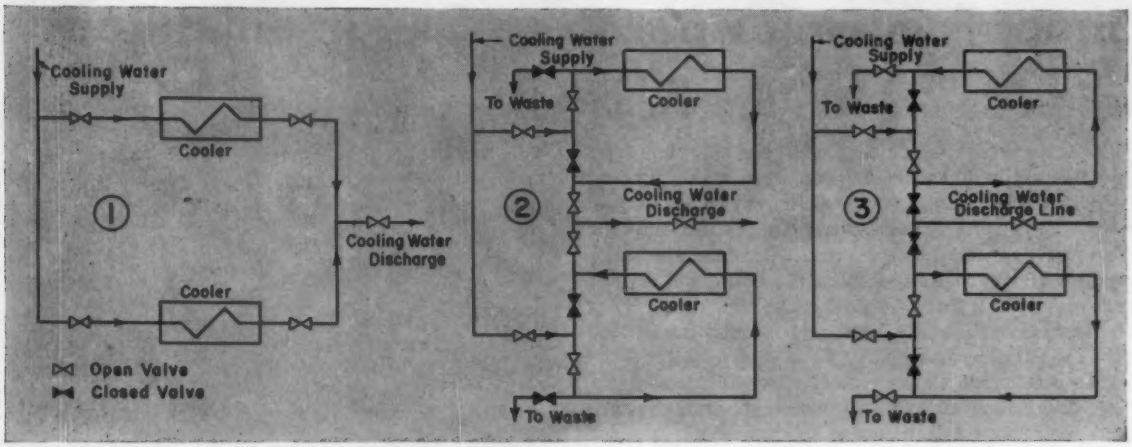
These services offer assurance of maximum operating continuity, on-the-spot application help, equipment efficiencies, valuable help in system design and techniques.
Get the full story from your General Electric Apparatus Sales Office. General Electric Company, Schenectady 5, N. Y.

303-6

LONGER LIFE and a reduction in costly service trips are expected to be proven by DP&L—G.E. tests on General Electric's new experimental distribution transformers. Here, Distribution Transformer Dept.'s M. Broverman, Mgr. Design Engineering (l.) and W. A. McMorris, Mgr. Advanced Product Engineering examine molded parts.

MORE POWER TO AMERICA

GENERAL ELECTRIC



GENERATION—Maintenance

Cooler Backwashing Method Is Saver

J. H. **GRIMES**, Shift Operator Engineer, Sporn Plant, Central Operating Co, New Haven, W. Va.

The use of river water to cool oil for Sporn Plant boiler feed pumps resulted in considerable oil-cooler maintenance expense despite straining of the river water.

Collection of the silt and fine debris on the tube sheets restricted the water flow and increased the oil temperature above a safe limit, making it necessary to remove the cooler heads, clean the tube sheets and inlet water boxes, and rod through the tubes.

To maintain better control of oil temperatures and minimize the cleaning expense, trial arrangements were made on one pair of coolers for Unit 1 boiler feed pumps to backwash the coolers periodically and wash the accumulation to a waste sluice. The original piping of the oil coolers (one is a spare) is indicated in Fig 1. The new piping and valves are shown in Figs 2 and 3 for normal-flow and backwashing conditions, respectively.

Ten months' use of this backwashing arrangement has demonstrated that it keeps the coolers clean. Not as much time is spent now in backwashing a cooler as was previously required in clearing the equipment for mechanical cleaning. The record kept on all boiler-feed-pump oil coolers during that 10-month trial is given in the table.

Each Pump Has Two Coolers

As each boiler feed pump has two coolers (one spare), the record shows that an average of slightly more than eight cleanings were required per oil cooler in ten months without backwashing facilities, or over 9¾ per year.

Based on the experience with backwashing of oil coolers for one boiler-feed pump, it appeared that the plant should be able to eliminate mechanical cleaning of all oil coolers. Accordingly there is now a backwash system on the 24 coolers for all 12 pumps. This change should eliminate approximately 900 man-hr of maintenance work per year.

Most of that gross saving could become a net saving after the first year if the initial expense for additional piping, valves, and installation were written off the first year as the subsequent expense would involve only maintenance of the 72 additional ¾-in. valves. The initial cost of the additional piping and of the six additional valves per air of coolers is estimated at $444 based on the current cost of ¾-in. valves (somewhat over $6 each). Installation of this additional equipment might cost $444 for labor, making a total initial cost of $888.

But that can be written off the first year to obtain an $1,800 net annual saving thereafter, except for valve maintenance.

Table—Number of Cooler Mechanical Cleanings in 10 Months

Unit No.	Equipment	Mechanical Cleanings
1	BF Pump with Backwash	0
1	2 BF Pumps without Backwash	27
2*	3 BF Pumps without Backwash	22*
3*	3 BF Pumps without Backwash	41*
4	3 BF Pumps without Backwash	89
	Total	**179**

*The low number of cleanings on these units were due to their outages during the 10-month trial period.

(*More How To on page* 90)

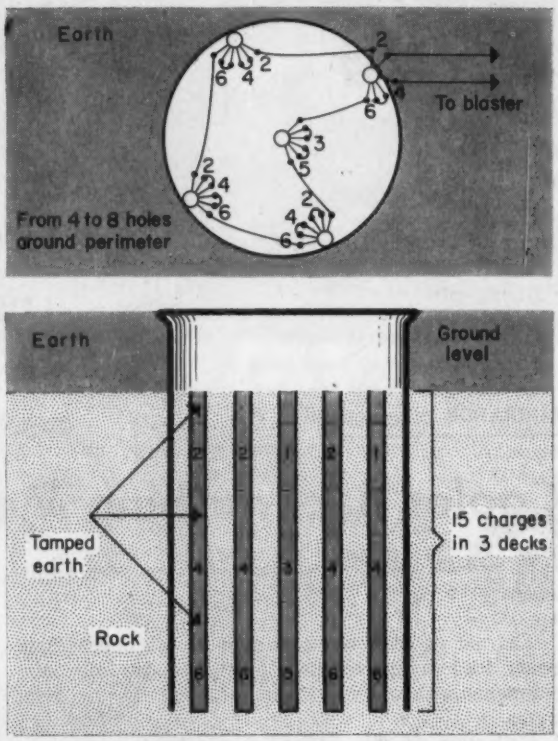
TRANSMISSION—Construction

Shoot Five Holes per Crew-Day in Solid Rock

W. G. BARTL, Digging Foreman, Idaho Power Co, Boise, Idaho

A two-man crew with a truck-mounted air compressor and 3-in. air hammer can dig five 24 to 36-in. dia pole holes per day in solid rock and mountainous terrain. A technique using delayed charges in multiple decks is responsible for this Idaho Power Co record. The blasting crews drill, load, and shoot the holes, but do not uncover or clean them. In solid rock, 75% of the holes do not require cleaning, and only a small percentage need redrilling or reshooting.

The illustration shows typical charge placement for three-deck firing. Delayed-type electric blasting caps are used, with about 1 sec between successive delays wired in series.



CHARGE PLACEMENTS are shown in a typical arrangement for three-deck firing of delayed-type electric blasting caps

Firings Take Place in Order

Firing takes place in the following order: No. 1 delay in the center of the upper deck; No. 2 delay (four to eight holes) around upper perimeter; No. 3 delay in the center of the second deck; and so on. The odd (center) delays shoot a conical hole, leaving the even (perimeter) delays to blow toward the center and leave a cylindrical section.

The last (No. 6) delay cleans the hole.

Instantaneous firing is not used, even for the No. 1 charge. Experience shows that this would break the connections to the succeeding caps.

All Caps Must Be Same Make

In the deeper holes, as many as four decks are used. Shallow holes, with part rock, may require but two decks.

Drilling for the bottom charge should be at least 12 in. lower than the predetermined hole depth. Though this may dig deeper than necessary, it is easier to fill than to redrill a hole which has been shot too shallow.

All caps must be of the same make to synchronize the firing sequence properly.

GENERATION—Maintenance

Turning Preserves Ash-Removal Piping

ROY M. LYNCH, formerly Mechanical Engineering Division, American Gas & Electric Service Corp, New York, N. Y.

Getting optimum life from bottom ash-removal piping is a major problem in generating stations. The answer involves selection of the most economical type of pipe and turning it periodically to distribute the erosion around the inside.

The most economical pipe gives the greatest wear-life per dollar of overall cost, including the total expense up to the time of necessary replacement. Differences in ash affect the wear-life experience, but it has been fairly well established that wear-life is proportional to Brinnell hardness and wall thickness.

Characteristics Given

Most pipe usually furnished for ash removal is made of white cast iron, but recent installations have been made with an abrasion-resisting alloy containing 4.50% nickel and 1.85% chromium. The relative characteristics of these materials are:

	Brinnel Hardness	Relative Wear-Life	Cost
Iron	350-440	1	1
Alloy	600-650	2-3	Nearly 2

When the alloy pipe is not renewed as often as white cast iron pipe, replacement labor expenses are reduced. The alloy pipe is furnished in 4-ft flanged lengths and in 16-ft lengths with plain ends. Most installations inside power plants have used flanged pipe; while yard installations have been made of pipe with plain ends.

To obtain maximum life from

(*Continued on page* 92)

Plates from REVERE for a BIG JOB

by C. H. WHEELER

Here you see two rolled Muntz Metal condenser plates, being drilled simultaneously in the plant of the C. H. Wheeler Manufacturing Co., Philadelphia 32, Pa. The plates were supplied by Revere. They measure 100-¾" x 203-¾" x 1-½" thick. Four plates were supplied for a Wheeler 2-pass divided water box unit having 95,000 sq. ft. of condensing surface. The overall length of the condenser, including water boxes, is 48 ft., and overall height, including steam dome and hot well is 34 ft.

Revere is an important supplier of plates and tubes for condensers, heat exchangers, and similar equipment, shipping to all parts of the country. Collaboration on alloy selection and specification is freely available. Just get in touch with the nearest Revere Sales Office.

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Only 5 inches of exposed metal at head.

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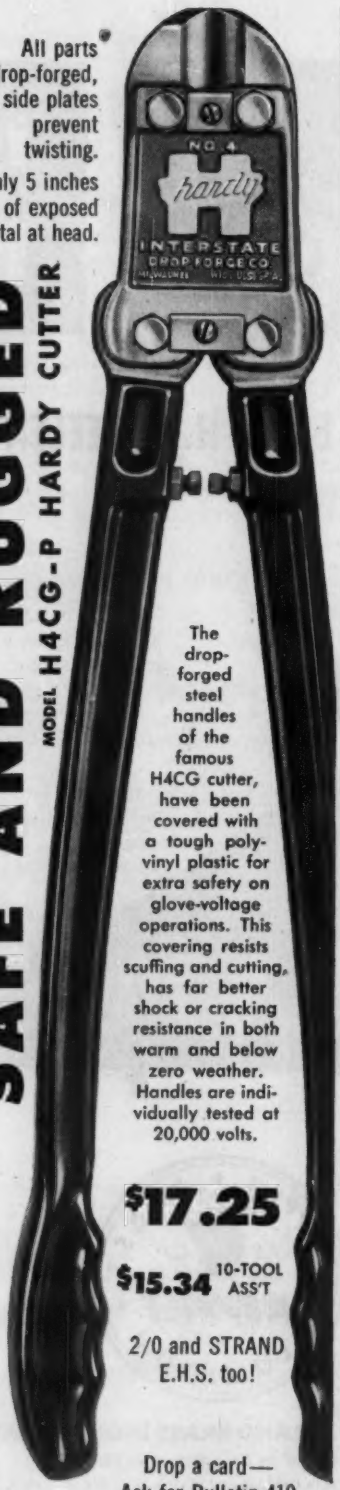
MODEL H4CG-P HARDY CUTTER



The drop-forged steel handles of the famous H4CG cutter, have been covered with a tough poly-vinyl plastic for extra safety on glove-voltage operations. This covering resists scuffing and cutting, has far better shock or cracking resistance in both warm and below zero weather. Handles are individually tested at 20,000 volts.

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Turning Saves Piping

(*Continued from page* 90)

bottom ash-discharge piping, it should be turned periodically to distribute the wear inside the pipe. Experience at some plants indicates that the pipe should be turned 120 deg each time. This rotation gives better distribution of wear than 90-deg turns which cause overlapping of wear patterns.

Inspections Periodic

The frequency of turning is determined from periodic inspections of ash-removal piping and calipering of pipe-wall thickness to ascertain the approximate rate of wear. Annual inspections for two or three years should be sufficient to determine the frequency of turning.

To simplify records and turning schedules, it is suggested that the date of installation be stenciled on the bottom of piping inside plants and on the top and side of pipes exposed in yard trenches. After the pipe is turned it should again be stenciled with the date in the positions suggested. Such pipe records show at a glance how long the pipe has been installed, how long it has been in its present position and when it should be turned again.

Such records greatly assist the engineering department in determining the most economical material to use for new ash-discharge piping installations.

GENERATION—Maintenance

UTILITY CHAIR is positioned in boiler by means of a tugger or chain fall

Utility Chair Speeds Boiler Maintenance

Boiler maintenance is facilitated at Indianapolis Power & Light Co plants by a utility chair from which maintenance men work. It is an adaptation of the bosun's chair.

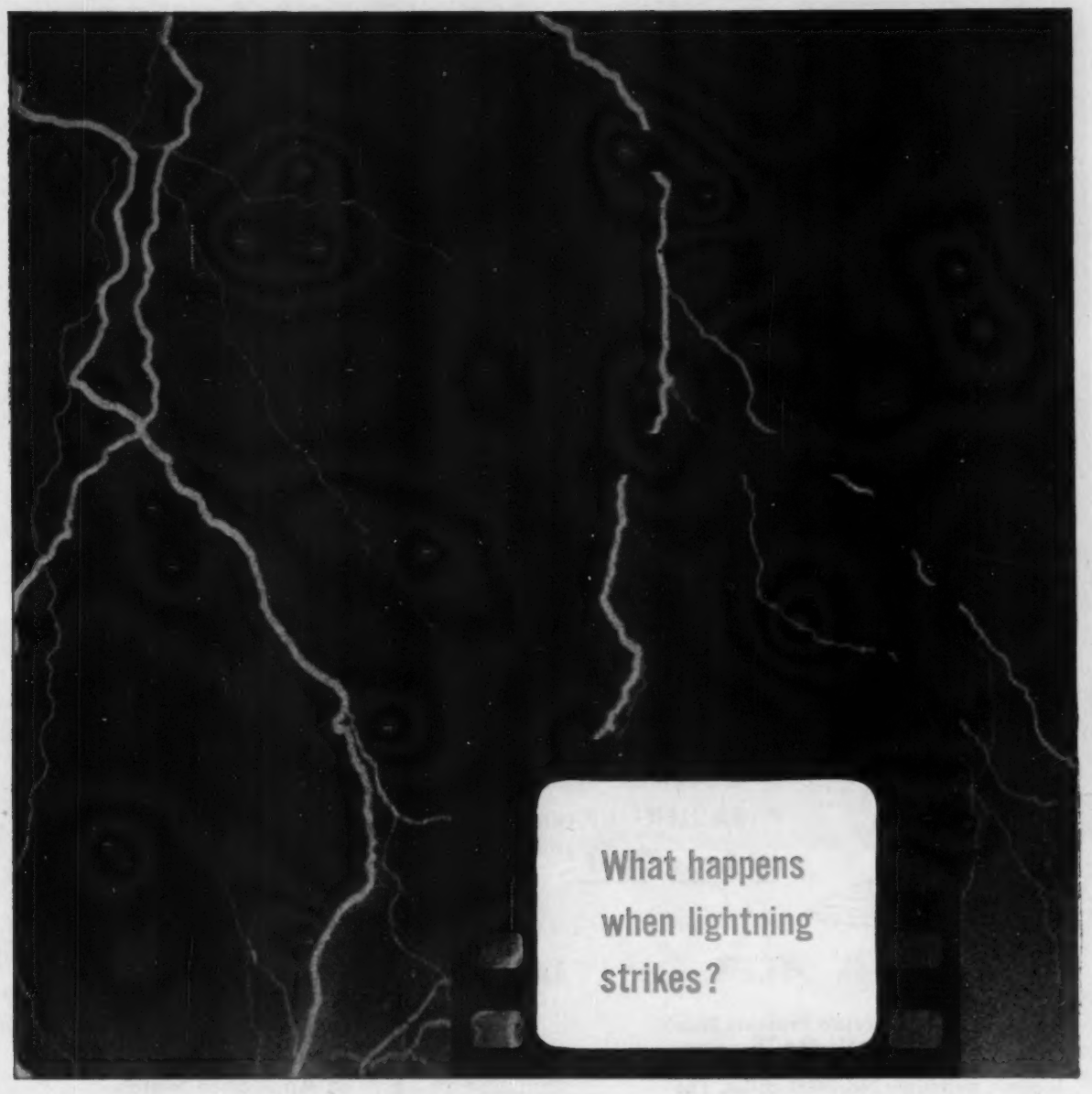
The utility chair was built primarily to provide easy access for inspection and repair of boiler tubes in high places where safety, convenience, and comfort are important.

The utility chair is easily handled by a tugger or chain falls. It weighs about 150 lb. Dismantling and reassembly take two men about 30 min.

As newer and larger boilers have no access doors to the upper sections, a bosun's chair, a stage, or elaborate scaffolding which is hazardous and costly, would be required. As the utility chair is readily dismantled and reassembled, getting it through the ash-pit door presents no problem.

The chair has a safety belt, overhead protection, containers for welding rod, space for additional tools under the seat, and a hinged shelf which lays in the welders lap for protection against weld sparks. It was designed and built by Virgil W. Padgett, Perry "K" Plant, Indianapolis Power & Light Co.

(*More How To on page* 94)



New Hubbard Film Demonstrates Lightning Arrester Operation

The subject of power system lightning protection is complex and difficult to explain by conventional methods. This film, using new techniques of animation and ultra-high speed photography, facilitates the understanding of the many variables entering into the problem of lightning protection.

Produced in the Hubbard Research Laboratories especially for utility personnel, this film entitled "The Magic Cylinder" details formation of natural lightning, the effects of lightning on a power system, the duty on arresters, and the operational characteristics of the types in current use.

In full color and sound, with running time of 28 minutes, the picture is without counterpart in its educational coverage of this complex subject.

You can arrange for a showing of this brand new color film by contacting the Advertising Department of Hubbard and Company, 6301 Butler Street, Pittsburgh 1, Pennsylvania.

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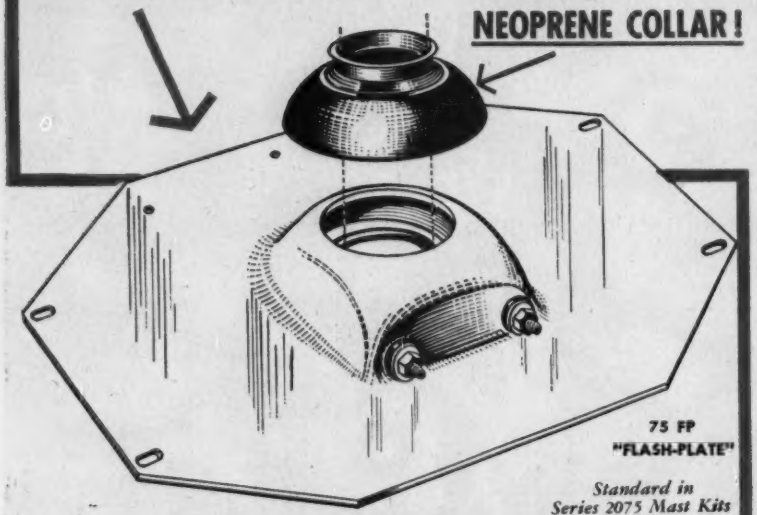
new

from Porcelain Products... combination roof-plate and flashing with NEOPRENE COLLAR!

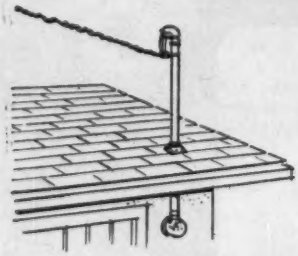


Standard in Series 2075 Mast Kits

Makes installation

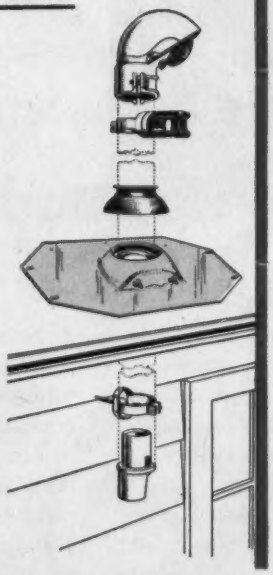
- **QUICKER—fewer parts**
- **EASIER—no caulking**

at Less Cost!



Now, Porcelain Products Mast Kits feature FLASH-PLATE, a combined roof-plate and flashing, plus a lifetime, watertight Neoprene collar. The "one-piece" feature makes Porcelain Products Mast Kits easier to install . . . provides a stronger, longer lasting, safer entrance mast . . . ALL AT *LESS* COST TO YOU!

Flash-plate is heavy, 14 gauge galvanized plate. It supports a 2″ or 2½″ mast on any roof, neatly and effectively, *with no caulking* needed. Available through recognized electrical distributors or write for further information.



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FINDLAY, OHIO

Jumper Tool Is Safer Bypass

A new temporary jumper tool gives Valley Electric Membership Corp linemen a safer way of bypassing sectionalizing equipment in 13.2-kv lines. The tool holds the hot jumper away from linemen.

The new tool is a flexible conductor about 10-ft long with a hotline clamp attached at each end. This conductor is supported on a cross-shaped frame of insulated sticks, the arms of which are hinged. Cords on the arms collapse them.

In operation, the temporary jumper is pushed up between the double crossarms and secured to the pole. Releasing the control cords opens the arms, carrying the hotline clamps close to the conductors on both sides of the deadends. Clamps are attached to the conductor by means of hot sticks. Removing the jumper reverses the procedure.

The jumper was invented by lineman Fletcher Graham of Natchitoches, La., who has a patent pending on the jumper and plans also to patent a crossarm gin. The gin is a wooden pole with a hook on one end which fits over the crossarm. Attached to the hook is a block and tackle for hoisting or lowering breakers or transformers.

Men Do the Shopping in Appliance Stores

Fully 56% of the appliance-store shoppers are males, according to a recent survey conducted for Look magazine. Based on a two-week shopping period, the survey showed that 13,400,000 people (over 10 yrs old) shopped in an appliance store. Of these, 7,800,000 were males and 5,500,000 were females . . . of the latter, 3,750,000 were housewives.

White-collar and blue-collar workers are came out about even: 13.0% and 13.8%, respectively.

Income-wise, the biggest group—8,450,000—are in the $3,000 to $6,999 bracket. Under $3,000 there were 2,850,000, and above $7,000 there were 2,100,000.

Do you worry about plant expansion wiring costs

WHILE YOU'RE WAITING FOR A TRAIN?

If you're worrying about the costs of a new power distribution system — either in your present building or in that new plant you're planning — here's one way you can cut down on the worrying. Just specify Rockbestos A.V.C. (asbestos, varnished cambric insulated*) Interlocked Armored Cable. It will not only assure you of dependable service but will help you cut costs several ways. Here's how:

- Rockbestos A.V.C. Interlocked Armored Cable eliminates the need for costly conduits or ducts — it's easily installed on racks or hangers.
- Less layout time — less installation time mean important dollar savings.
- It permits planning for future installations — again at minimum cost.

Add to these direct cost-cutting advantages the long range economy of using a cable that gives you high current carrying capacity, that keeps maintenance at an absolute minimum and you can see the big savings possible when you specify and use Rockbestos A.V.C. Interlocked Armored Cable.

Get full details on dollar saving Rockbestos A.V.C. Interlocked Armored Cable — write now for complete specification and application data.

*Single conductors are N.E.C. type AVA

ROCKBESTOS PRODUCTS CORPORATION

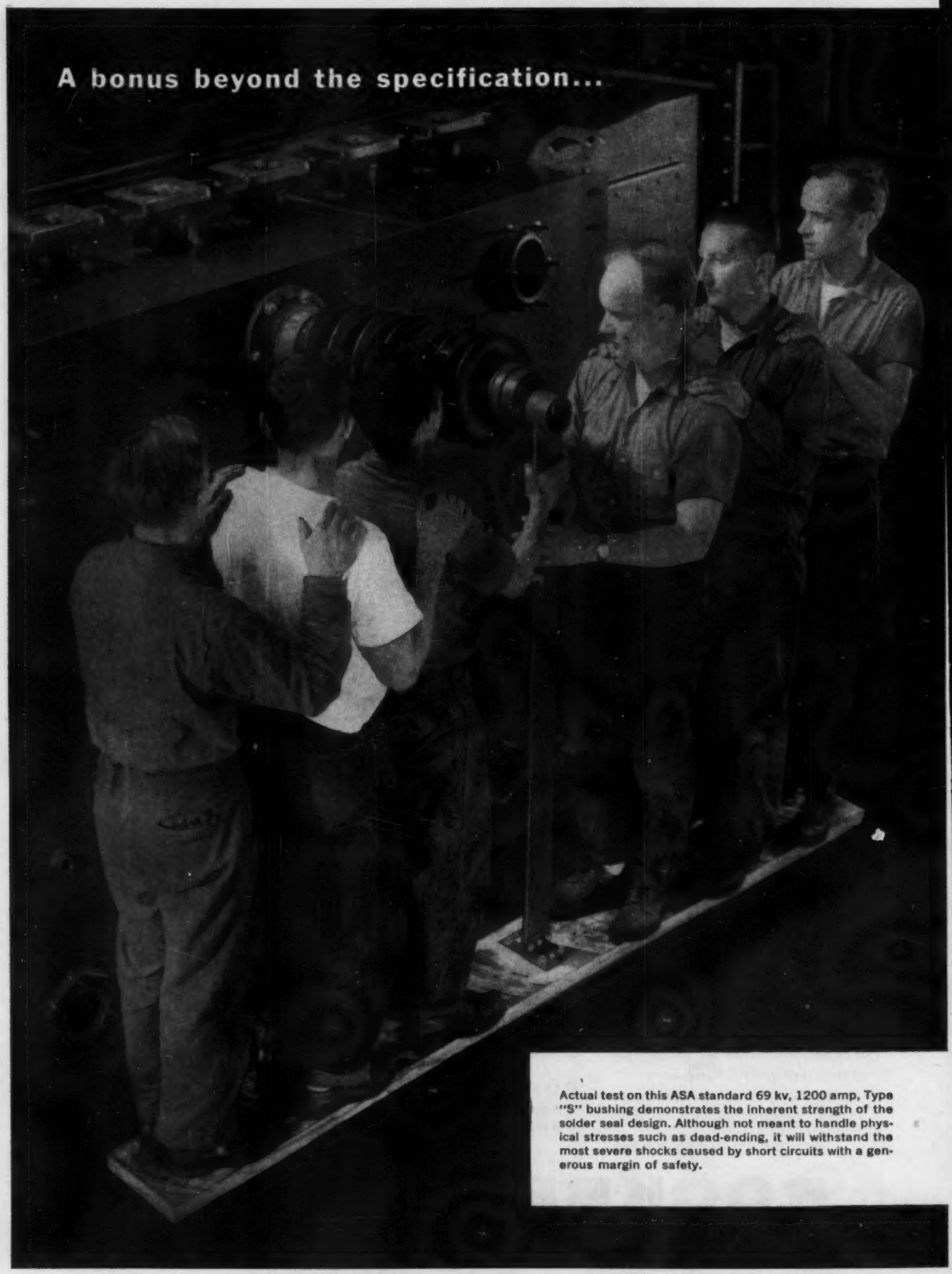
NEW HAVEN 4, CONNECTICUT

NEW YORK, CLEVELAND, CHICAGO, PITTSBURGH, LOS ANGELES, DETROIT, ST. LOUIS, ATLANTA, DALLAS, OAKLAND, SEATTLE

ROCKBESTOS

A. V. C. Interlocked Armored Cable

For New Buildings, Expanding Existing Circuits, Relocating Old Circuits



Actual test on this ASA standard 69 kv, 1200 amp, Type "S" bushing demonstrates the inherent strength of the solder seal design. Although not meant to handle physical stresses such as dead-ending, it will withstand the most severe shocks caused by short circuits with a generous margin of safety.

SOLDER SEAL . . . stressed to the ultimate without damage

For transformers and circuit breakers . . . durability like this can't "just happen" . . . it has to be planned

Engineered to withstand severe electrical, thermal and mechanical stresses, Westinghouse condenser bushings can take far more punishment than they will ever get.

The result of fifty years' field experience plus continuous research, Westinghouse Type "S" bushings needed no basic construction change to meet ASA standards.

Superiority has been proved in service with such features as:

Unequaled Mechanical Strength—provided by exclusive Westinghouse solder-sealed construction, together with one-piece, wet-process porcelain casing. This allows deflection under severe short circuit stresses without damage to sealed joints.

High Dielectric Strength, Low Power Factor—provided by numerous conducting foil layers, and generous thickness of high-grade insulating paper.

Extra Thermal Strength—assured by liberal conductor cross-section and low dielectric loss. High thermal capacity, no hot spots.

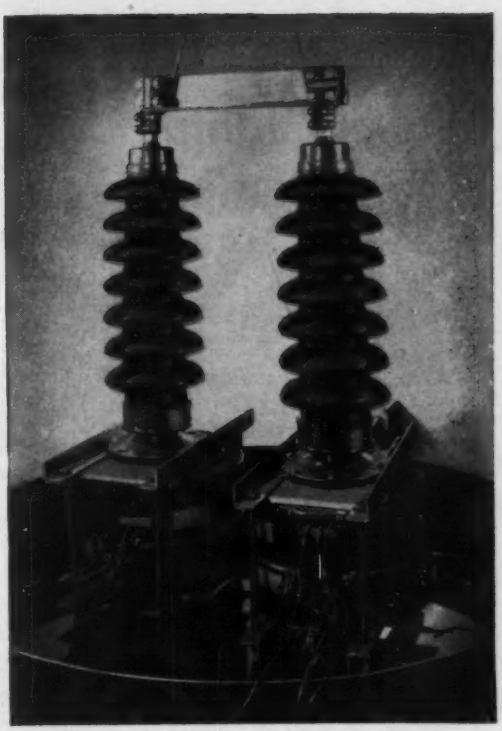
Absolute Sealing Against Moisture—provided by solder seal construction which eliminates gasketed joints. High-viscosity plastic filler gives additional internal protection by providing a positive bond which prevents voids at all temperatures.

Freedom From Corona—maintained by uniform voltage gradient and controlled by testing every bushing.

For complete information about Type "S" condenser bushings, call your Westinghouse representative . . . or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-70815

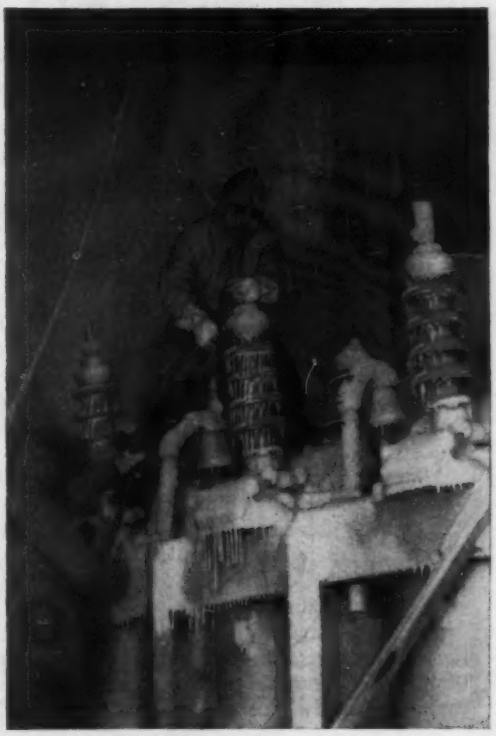
YOU CAN BE SURE . . . IF IT'S

Westinghouse



Exceptionally severe thermal stability test fails to decrease bushing strength. Tested by 12 hours immersion in hot oil at full rated current, one hour at twice normal voltage.

Work-worthy under any temperature extreme. In the Type "S" bushing, exclusive Westinghouse filler plastic eliminates voids at all points and at all temperatures down to –60°F.



APCO Jumps Heat Pumps 60% in '56

E. A. WILSON, General Sales Manager, Alabama Power Co, Birmingham, Ala.

Heat pump promotion conducted by Alabama Power Co since 1950 is showing progressively increasing results year by year. During 1956 the number of heat pump installations increased more than 60%, bringing the total to 521 (604 units). Of the total number, 347 are residential, 159 commercial (including 50 in facilities of Alabama Power), and 15 industrial. During the first five months of this year 108 more heat pumps have been installed. Breakdown: Residential—70; Commercial—34 (four in company offices; and Industrial—4.

These installations went in not by chance but because of a long-range planning altitude.

First Test Units Went in '47

It was this attitude on the part of the company that in the early 1940's led to a study of the potentialities of heat pumps as a practical method of year-round heating and cooling. Our company and several other Southeastern utilities employed Southern Research Institute of Birmingham to explore the possibilities. Results looked promising, and in 1947 we installed four units in a two-story annex to our general office building.

With satisfactory operation of these units and with evidence of a growing interest in such applications, the company in 1950 took on a specialist in its Residential Sales Department. His duties were to promote heat pumps and to help customers install electric space heating and air conditioning equipment.

Because heat pump acceptance is continously broadening, Alabama Power is gaining a substantial and highly desirable electric load. Prior to 1952, we always had a winter peak. But summer air conditioning completely reversed this trend. For the past five years the summer peak has increasingly exceeded the peak for the following winter, Fig 1. Also, the increased kwhr consumption of the urban residential customers follows monthly peaks in almost direct proportion, Fig. 2.

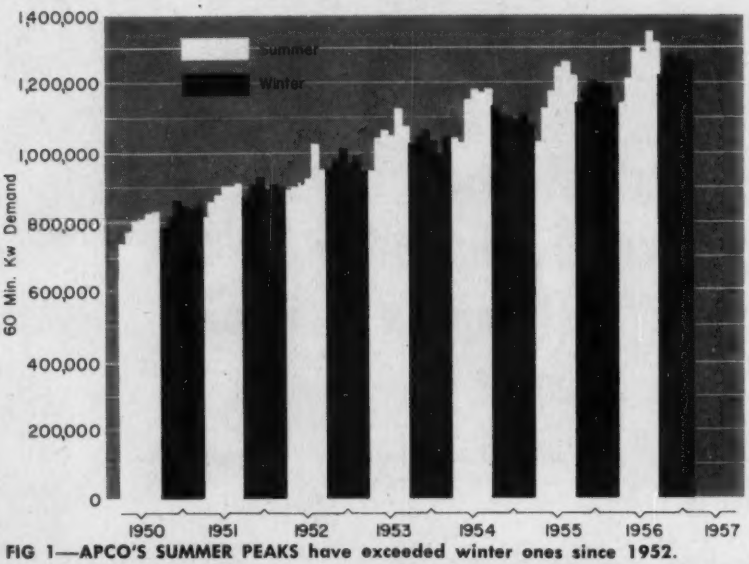


FIG 1—APCO'S SUMMER PEAKS have exceeded winter ones since 1952.

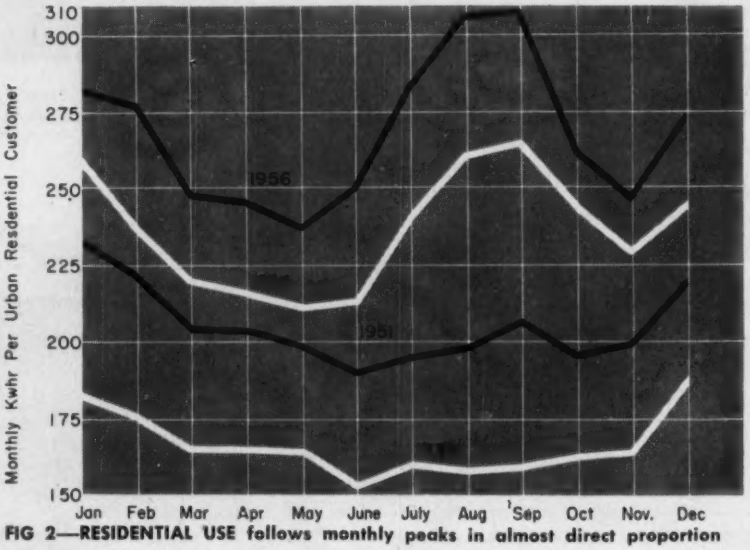


FIG 2—RESIDENTIAL USE follows monthly peaks in almost direct proportion

The heat pump promises to be an ideal means of leveling out these peaks. In a recent study of 10 typical heat pump customers and 10 straight air conditioning customers, energy use patterns during 12 months indicated that heat-pump customers used 10.7 times their summer peak month's kwhrs, whereas the annual use of the customers having conventional air conditioning only was 7.2 times their summer peak month's kwhrs. In addition, peak use of kwhr for heat-pump customers occurred during the winter months, Fig 3 (p 102). This is desirable for the utility in view of the present unbalanced relation between winter and summer system peak loads.

To actively promote the increased installation of residential heat pumps, the company has employed seven heating and air-conditioning engineers. Rural service engineers have been sufficiently informed to

(*Continued on page* 102)

where there's a road there's Southwire Service

SERVICE on a par with the quality of its products has always been a basic policy of Southwire.

To assure customers of on-time delivery, Southwire operates its own modern fleet of trucks. They travel nearly 3 million miles a year—from coast to coast and border to border.

Many of Southwire's trucks operate on regular schedules. All of them are manned by courteous drivers with years of cable-handling experience—your assurance of damage-free delivery. You are relieved of transportation responsibility, and your empty reels are picked up by Southwire's trucks.

Flexible manufacturing schedules, close attention to special orders, and complete warehouse stocks, enable Southwire to provide dependable deliveries to your warehouse or direct to the jobsite.

Specify Southwire products and get Southwire service automatically.

SOUTHWIRE serves the world

Southwire® Company

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with these quality products:

- Bare and Weatherproof Copper and Aluminum Line Wire
- Neoprene, Polyethylene, and Southwire Vinyl Weatherproof Copper, Aluminum and Triplex
- U.R.C. (DBWP, TBWP) Copper
- Copperweld® Conductors
- Copper and Aluminum Building Wire
- ACSR and All Aluminum Cable
- Galvanized Steel Guy Strand and Static Wire
- Aluminized Steel Guy Strand and Static Wire
- Aluminum Alloy Wire
- Cable Accessories

PRIMARY UNIT SUBSTATIONS

CUSTOM BUILT FOR YOU —AT NO EXTRA COST

Here at I-T-E, complete primary unit substations are custom designed and engineered to meet your particular requirements. I-T-E engineers skillfully knit together quality I-T-E substation components in a way to give you the advantages of versatility, reliability, safety and convenience.

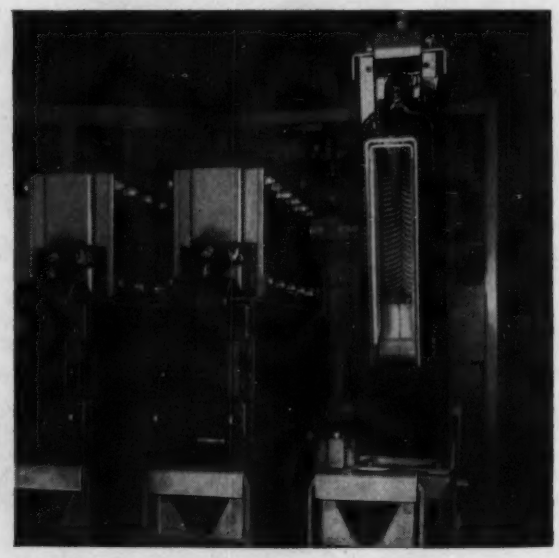
Particular emphasis is placed on ease of installation to meet all your requirements for growth and relocation, with full regard to an appearance that fits well into your surroundings.

Typical I-T-E quality manufacturing standards further insure that your substation will give you the maximum reliability and performance at the lowest cost. Delivery can be made in accordance with your own construction schedule. You can save time, trouble and money in completing the final job.

I-T-E primary unit substations are available for any application and in any standard rating. For details, call the I-T-E sales office near you. Or write I-T-E Circuit Breaker Co., 19th & Hamilton Sts., Philadelphia 30, Pa.

Engineered to insure the best value

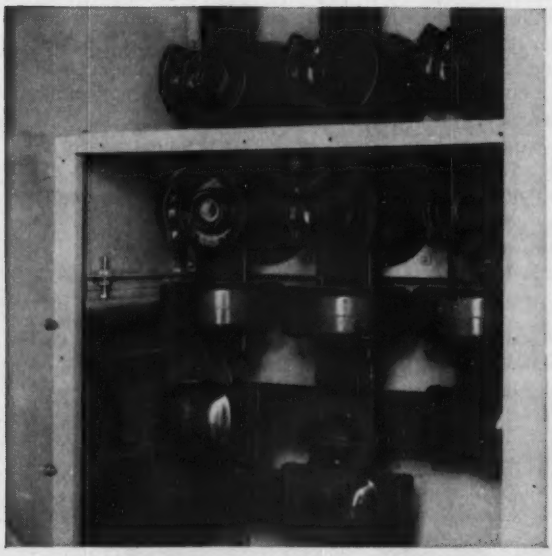
Horizontal drawout air circuit breakers. Even heavy 13.8-kv circuit breakers roll out easily on permanently attached wheels. Safety shutters automatically close over bus openings when breaker is moved to test position or from enclosure.



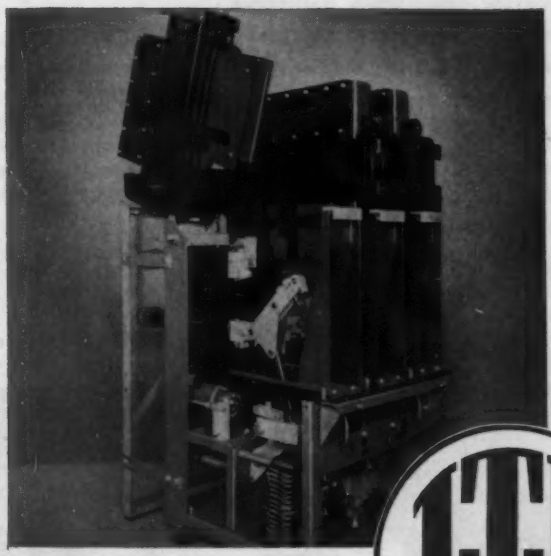
Positive arc interruption. Double coil, closed iron magnetic circuit produces intense magnetic effect, drives arc rapidly and uniformly between plates in arc chute, where it is extinguished, giving faster interruption, longer arc chute life.

I-T-E CIRCUIT BREAKER COMPANY—Switchgear Division

and the most reliable performance



Fully isolated main bus with flame-retardant insulation. Bus is held in alignment against short circuit stress by porcelain bus supports. Flame-retardant insulation covers entire bus, including porcelain primary disconnect housings.



Simplified maintenance. Pivoting arc chutes simplify routine inspection and upkeep. Auxiliary devices are positioned to permit easy access.

IN CANADA: EASTERN POWER DEVICES LTD.

The Old Reliable

EVERSTICK ANCHORS...

EXTRA Holding Power
QUICKLY Installed
TOUGH For long life

● They speed up work and provide dependable anchorage in new construction and maintenance. Quick and easy to install—made of tough rust-resistant malleable iron—their holding power "tops" all other. Available two-way, three-way, four-way, and cone types. Write for facts.

AN EXCLUSIVE EVERSTICK FEATURE
Exclusive Everstick nut housing Locks anchor firmly on rod. No chance of rod slipping thru anchor.

EVERSTICK ANCHOR CO
FAIRFIELD, IOWA

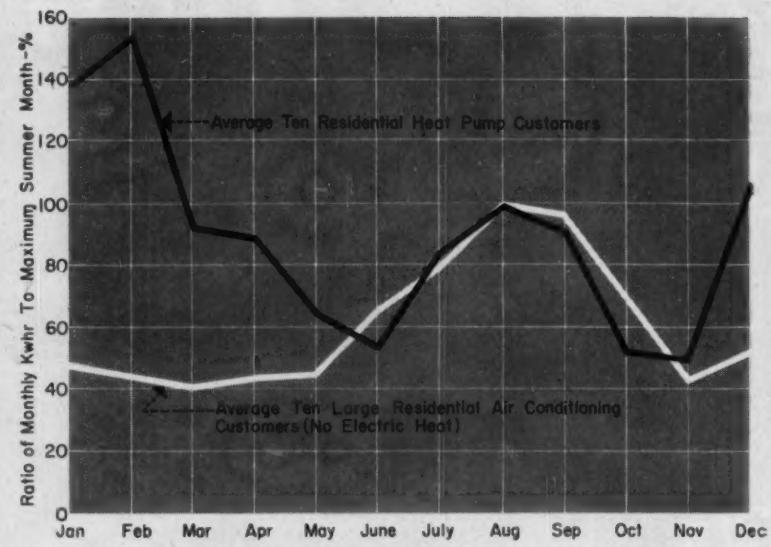


FIG 3—HEAT PUMP CUSTOMERS' peak kwhr use occurs during winter months

be of use in developing prospects in rural areas. Commercial sales engineers have also been trained to promote heat pumps, and three engineers have recently been added to the residential and commercial general office staff to assist.

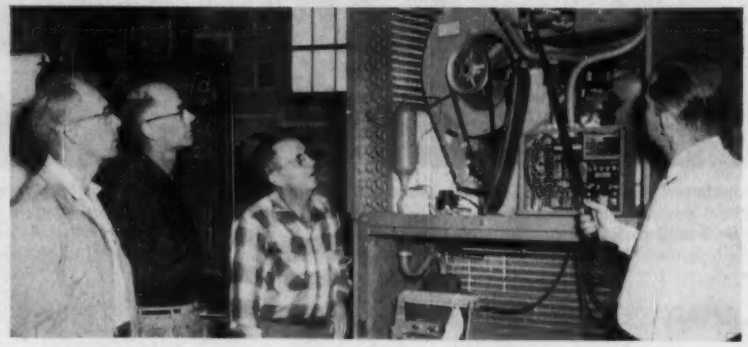
The program is gaining momentum. Much effort is being devoted to a program of mutual assistance and promotion with heat pump dealers, distributors, and manufacturers. During 1956, the company began holding meetings in principal cities with "buying influence" people—architects, builders, air-conditioning companies, sheet-metal companies, financing agencies, and others—to push heat pumps. The company sponsors "open-house" demonstrations at new all-electric homes with heat pumps, furnishing specialists to answer questions.

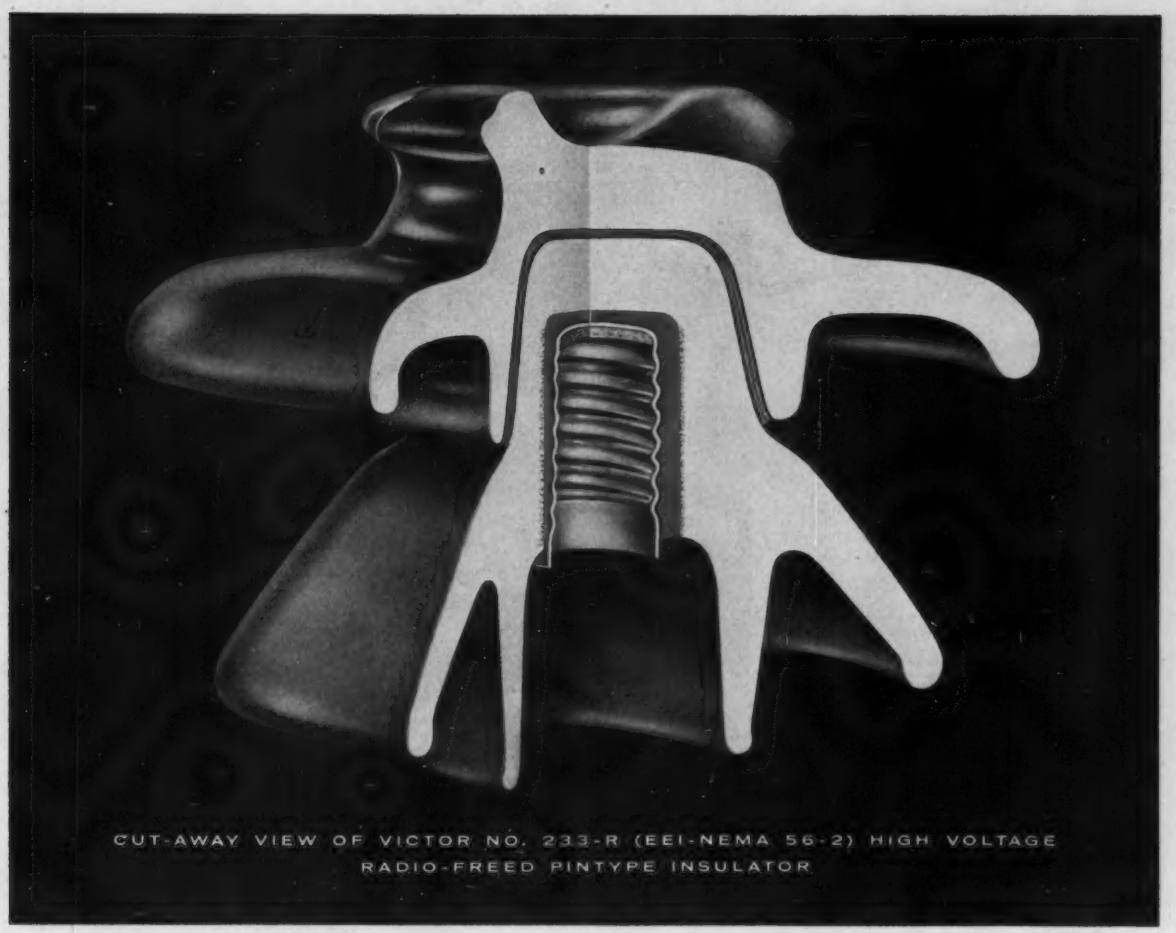
One of our most valuable selling tools is a manual containing signed testimonial letters from satisfied users. It shows pictures of the homes and a record of the monthly energy requirements and billing along with other partinent information for each installation. A similar four-page promotional leaflet has been developed for distribution to prospective users, architects, and other sales allies. Newspaper ads helped in creating widespread public interest.

Each year that the heat pump is in use brings new manufacturers to the field with their added promotional efforts.

(*More Selling on page* 104)

SERVICE SCHOOL on heat pump operation is conducted by Alabama Power Co as a regular part of its area-wide heat pump promotional activities





CUT-AWAY VIEW OF VICTOR NO. 233-R (EEI-NEMA 56-2) HIGH VOLTAGE RADIO-FREED PINTYPE INSULATOR

VICTOR HIGH VOLTAGE PINTYPES COST NO MORE THAN ORDINARY INSULATORS!

VICTOR High Voltage Pintypes are the industry's greatest value! Only with VICTOR do you get premium quality insulators without paying premium prices.

These insulators are laboratory designed, manufactured and tested with the industry's most modern equipment. They are made of VICTOR *Purified* Porcelain—finest insulator porcelain ever made. They are *precision* made. Shells are accurately aligned. Machine-spun zinc thimble assures perfect pin fit. VICTOR'S radio treatment, *distinguishable* and *permanent*, eliminates your radio interference problems.

Scientifically fitted glaze gives added strength and added protection against contamination. Beaded edges give higher impact strength. Each insulator is designed to withstand steep front impulse waves in addition to the normal 1.5 x 40 standard impulse wave. Full size, smooth top and side grooves insure proper conductor seating. When you buy VICTOR, you just can't buy better high voltage pintypes—at *any* price!

Nothing beats Porcelain **FOR ELECTRICAL INSULATORS!**

VICTOR INSULATORS DIVISION

I-T-E CIRCUIT BREAKER CO., INC. • VICTOR, N.Y.

Air Conditioning Key to Accurate Machining

Holds tools and machines between 68 and 70 F for 48 hr before working.

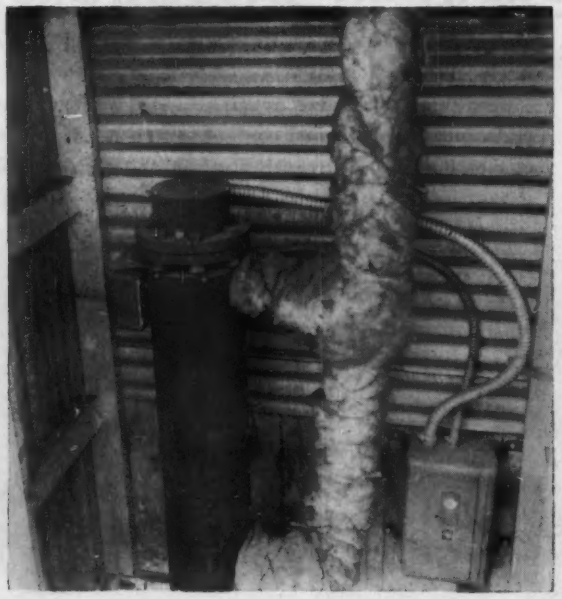
CHARLES C. MILLAR, Power Sales Engineer, Pennsylvania Power & Light Co, Wilkes-Barre, Pa.

An air conditioned machine room was the key to precision tool and die work and a bigger volume of business at Acme Metal Products, a Wilkes-Barre, Pa., manufacturer of precision metal parts for aircraft, business machines, and similar applications. A 3-ton unit, installed in a special room, holds tool and material temperatures between 68 F and 70 F, permitting accurate work with tolerances as close as plus or minus (0.0001) one-ten-thousandth of an inch.

Parts are machined on a jig borer with optically regulated measurements which is very critical to temperature control. All materials to be worked are tempered in the room at these temperatures for at least 48 hours before being worked. Tools machine parts and dies are given a similar treatment before inspection and gauging for acceptance. Built with a vestibule and double doors, the special windowless room has the conditioned air deflected toward the ceiling to avoid drafts. With the increased demand for close tolerance machine parts, Acme is receiving many new and increased orders for this type of work.

It is essential that these parts be machined under exacting temperature conditions.

Three-ton air conditioner in special room permits accurate work to tolerances within plus or minus 0.0001-inch on optically regulated jig borer.



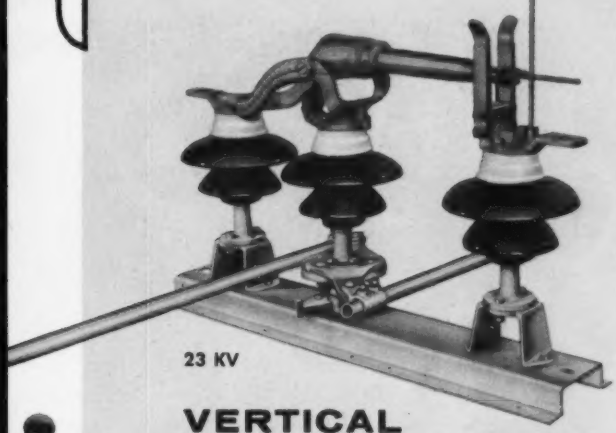
Circulation Heater Cuts Acetylene Gas Costs

GLEN J. ALDEN, Industrial Sales Engineer, Minnesota Power & Light Co, Duluth, Minn.

An electric water circulation heater, installed to heat tanks of acetylene during cold weather, have produced a substantial savings in gas costs at the Duluth Iron & Metal scrap yard in Duluth, Minn. Moreover, there is no fire hazard from the heat source. The heater, rated 15 kw and operated from a 240-v line, is located in a metal enclosure attached to a small unheated building which houses 30 tanks of acetylene. Piping installed adjacent to the tanks circulates hot water from the heater and enables the company to get the maximum possible amount of acetylene out of each tank, despite severe winter weather.

When the tank is heated, the pressure of the gas inside increases. This causes and additional amount of acetylene to flow out of the tank and decrease the residue to minimum practical point.

ENGINEERED



23 KV

VERTICAL BREAK SWITCHES

7.5 to 230 KV
400-600-1200 Amps.

The design simplicity of these new vertical break switches permits exceptionally easy installation, completely dependable operation with minimum maintenance, yet incorporates all the features power men want for substation and pole top switching.

TYPE H1 ROTATING STACK SWITCH

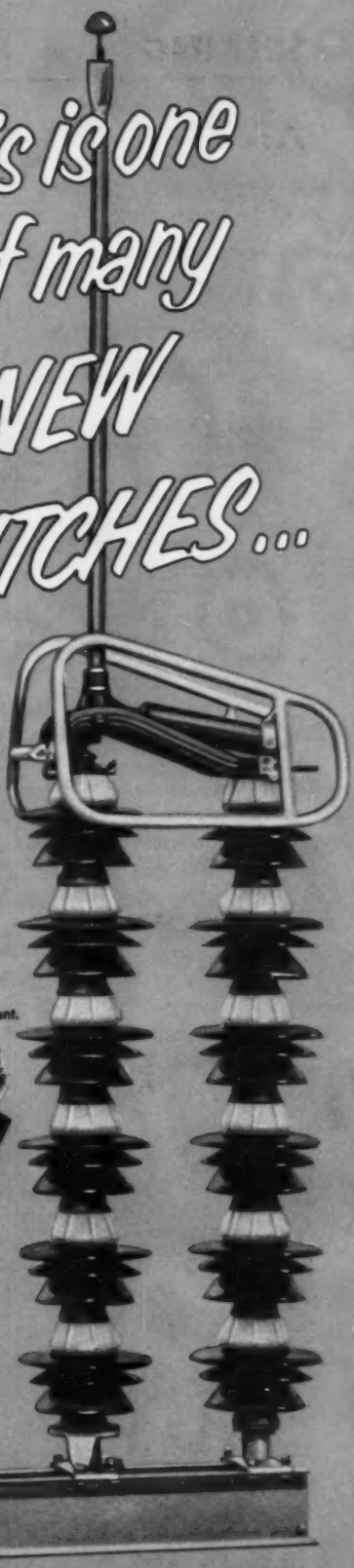
A simplified blade-actuating mechanism, with only three moving parts, gives years of dependable switching in any kind of weather. The highly conductive current path has braidless, sealed silver-to-copper hinge contacts and *high pressure* silver-to-copper adjustable jaw contacts. Type H1 Switches meet all AIEE and NEMA Standards.

230 KV (1050 BIL)

"This is one of many NEW SWITCHES..."

...you'll see in this ad on our completely modernized line... all designed to meet today's increasingly complex systems."

C. A. "Chuck" Liming,
A. B. Chance Company,
Sales Manager,
Power Switching Equipment.



Serving the Utility Industries since 1907

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A. B. CHANCE COMPANY

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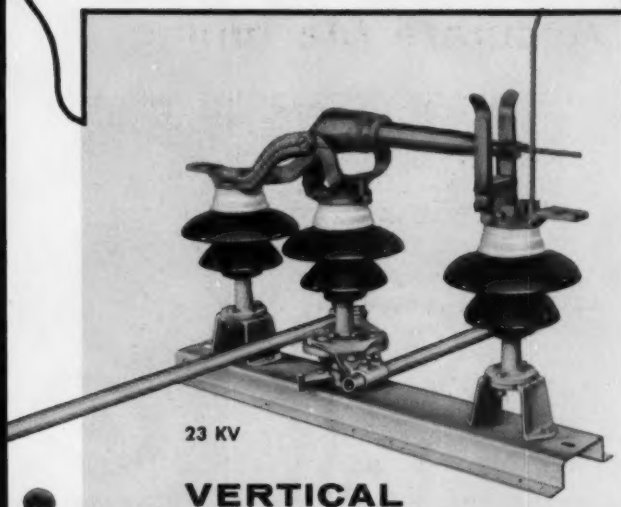

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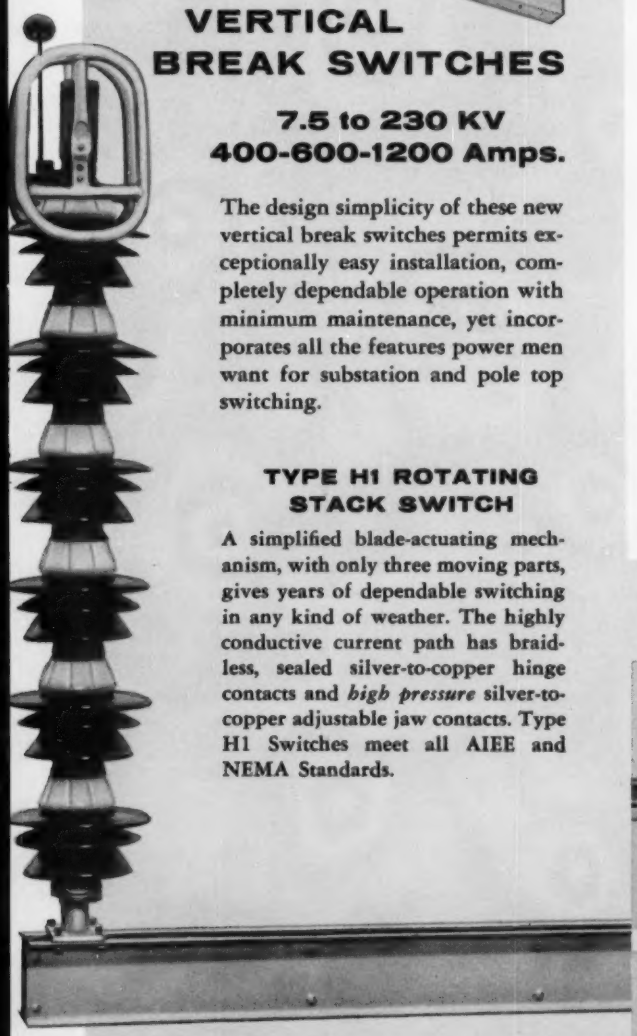


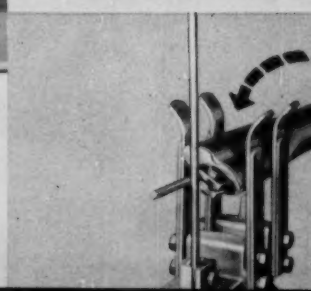
230 KV (1050 BIL)

Type S Side

Here's a ruggedly-built, alizing, disconnecting, b easy to install — to oper strength and thermal ca today's extremely high f Current path has braidle contacts and high pressu jaw contacts. 7.5 throug

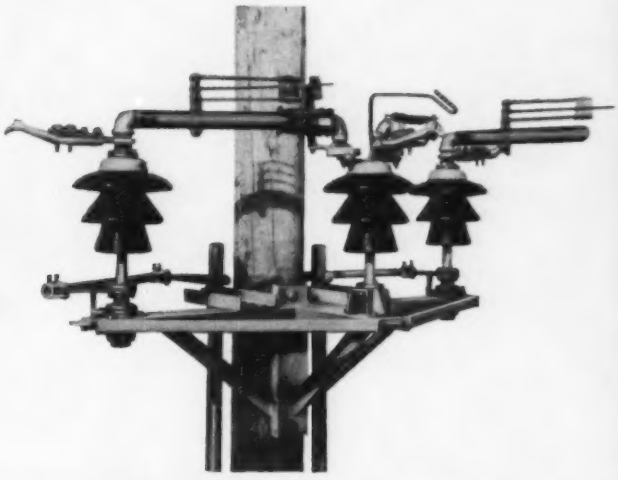
Type C Center Break Sw are available in ratings 41

These Chance S



better system operation today and tomorrow!

HORIZONTAL BREAK SWITCHES



ide Break Switch

uilt, economical switch for section-
ng, by-passing, and isolating. It is
operate – and has the mechanical
al capacity necessary to withstand
igh fault currents without damage.
raidless, sealed silver-to-silver hinge
ressure silver-to-copper self-wiping
rough 69 KV, 400-600-1200 Amps.

k Switches, with the same features,
gs 41 to 161 KV, 600 and 1200 Amps.

Type GS GOABS (Group Operated Air-Break Switches)

Designed for vertical phase-above-phase mounting on a single wood pole. This single pole mounting means lower initial and maintenance costs and minimum right of way requirements. Built with the performance features of the Type S Side Break Switch, GOABS also offer braidless current path construction with sealed silver-to-silver hinge contacts and *high pressure* silver-to-copper jaw contacts. GOABS feature all-welded, completely assembled frames—installation time is minimized. Full NEMA Rated—7.5 to 69 KV, 400-600-1200 Amps. 2-way and 3-way.

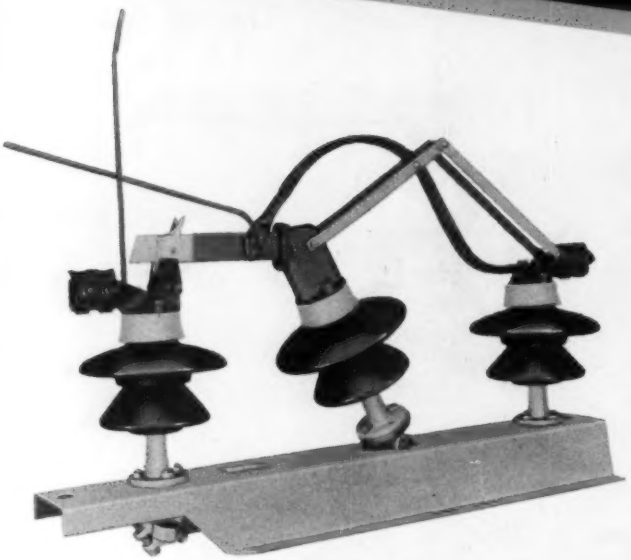
e Switches have self-wiping high pressure contacts

Jaw and blade contacts of these Chance Switches are all designed to provide effective self-wiping action to clean the contacts without abrasion each time the switch is opened or closed. Contacts are silver-to-copper for highest conductivity and have mechanically applied high pressure to positively hold the switch blade in position under heavy short circuits or surges.

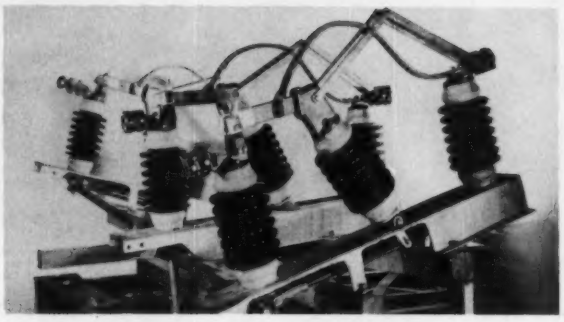
Top illustration shows the basic design used in horizontal break switches. Pressure is accurately adjusted at the factory, but field adjustment can be made with a wrench if desired.

Lower illustration shows how high pressure is applied on the vertical break switch jaw end. Flattened blade rotates into the jaw contact, deflecting the contact shoes to create the high pressure with minimum operating effort. Contact shoes are kept under constant pressure by non-current carrying beryllium copper springs.

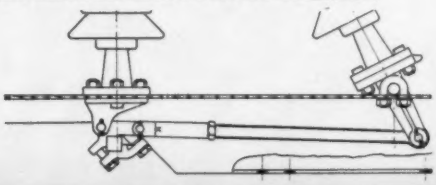
"COMPENSATOR CONTROL"... Your most important reason for selecting Chance Tilting Insulator Switches



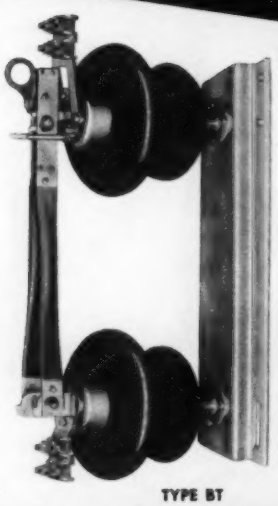
Even the most extreme warping of crossarms will never distort the mounting of gang-operated switches as greatly as the torture rack test shown at right. But even if it did—Chance Type WN or VN SWITCHES would still open and close uniformly and easily. The reason?... Chance Compensator Control that operates each phase independently of the others—that eliminates closing shock and gives extra leverage for smooth, effortless operation. Compensator Control also keeps the operating force in line with the blade motion.



There are other features you'll like, too—easy installation of the interphase shaft without "threading"... extra wide tilting insulator mounting that eliminates sideplay... deep-drawn bases to protect the operating mechanism... flanged edges that won't cut into wood supports... ice-breaking "crowbar action" of the blade, made possible by a pivoting pin in the blade, that makes it easy to open or close these switches under the most severe ice conditions.



CHANCE Disconnect Switches ruggedly built for extra years of service



CS97-4

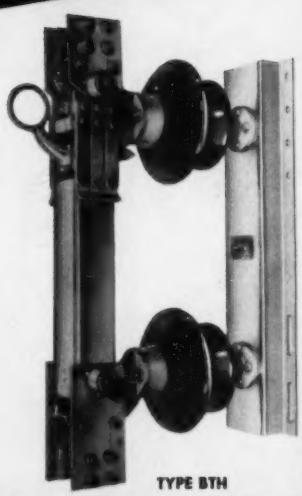
TYPE BT

Reliability of operation and reliability of performance are design characteristics of the Chance BT line of hookstick disconnect switches. Rigid blade design and self-aligning contacts mean positive closing even when it is necessary to operate with heavy side thrusts. Blade latch and centered contact pressure hold switches securely closed against heavy current surges. Pry-out action gives extra leverage for easy opening. 7.5 through 115 KV, 200 to 1200 Amps.

NEW 2000 Amp. Type BTH—7.5 through 46 KV

Features *high pressure,* silver-to-copper contacts; toggle-action of jaw applies high pressure with minimum operating effort. Double blade-latch holds switch firmly in closed position; releases easily with a pull of the hookstick.

Rugged, straight-through design provides high conductivity path; rigid square-hollow blade and bus-bar copper construction give security against damage from heavy fault currents.



TYPE BTH

Descriptive Bulletins on all these new Chance Switches are yours for the asking. See your Chance Switch Representative, or write A. B. Chance Company, Centralia, Mo.

A·B·CHANCE CO·

ABC INDUSTRIES

Secondary Capacitor . . .

has rectangular design to permit complete impregnation and mounts in any position. Absence of voids reduces possibility of internal failure. Flat sides allow unit to expand safely and contain internal pressure generated by normal temperature rise. Materials used minimize generation of heat; design allows it to be dissipated quickly.

Alumina ceramic bushings resist chipping or cracking during handling. Corrosion resistant case needs no painting. Capacitors use lightning arrester-cut-out mounting bracket, suitable for either crossarm or direct-to-pole mounting. Red-flag indicating fuse and thermostatic switch are optional. Units are available in 240-v ratings of 3, 5, and 7.5 kvar for residential applications.
General Electric Co, Schenectady 5, N. Y.

Glass Epoxy Laminate . . .

can be used continuously at 300 F and intermittently at higher temperatures. Material combines flame retardent properties with high strength and good electrical characteristics. Applications include switchgear components such as circuit breaker arms, flash-guards, and insulating barriers where danger of electrical fires requires self-extinguishing materials. Sheets are from 0.010 to one inch in thickness.
Continental-Diamond Fiber Corp, Newark, Del.

Service Truck Body . . .

providing greater capacity on minimum wheelbase, can be obtained on the FC-150 cab-over-engine Jeep. Compartments for storing tools and equipment face outward on both sides of the vehicle, leaving truck bed open for large pieces of equipment or material. The 4-wheel drive vehicle has an 81-in. wheelbase. Normal cargo space is 74.5 in., increased to 92 in. by extending tail gate. Winches are also available.
Willys Motors, Inc, Toledo 1, Ohio

Recording Potentiometer . . .

has two pens on a single 5-in. strip chart. Both write margin-to-margin, producing two continuous records. Each pen has one front set and three back set limit switches. Typical specifications are 0.5% accuracy for each pen; sensitivity, 0.14% of scale span; maximum source impedance, 1,000 ohms per mv of span; mv or tc calibration.

Optional features include transmitting slidewires, selsyn or synchronous motor drive, automatic reference junction compensation, margin marker pens, table or panel mounting, and quick change or manual change gears for 3-speed chart drive.
Westronics, Inc, 3605 McCart, Fort Worth, Texas

Re-rated Motors . . .

with reduced size and weight, include ⅛ to one hp rating. These Model R motors are designed in frame sizes 56 and 48 and may be obtained in polyphase, capacitor single phase, permanent split capacitor, and (in smaller ratings) split phase types. Selective substitution of aluminum for cast iron and more effective use of copper and steel cut size and weight. Redesigned ventilation system contributes to smaller frame size. Slot insulation is Mylar polyester film. Either sleeve or fully sealed ball bearings are obtainable.
Robbins & Myers, Inc, Springfield, Ohio

Safety Hat and Cap . . .

resist over 20 kv, are strong and flexible to cushion impact. Soft sweatband all around inside is adjustable from size 6½ to 7¾. Colors include white, yellow, and grey. Non-metallic chin straps and winterliners are available.
Jackson Products, Air Reduction Sales Co, 31739 Mound Rd, Warren, Mich.

(*More New Equipment on page* 112)

"The new Space-Miser is a big forward step in transformer design," says Mr. Howard A. Brown, Superintendent of Electrical Distribution for the Rochester Gas & Electric Corporation. "The new, smooth surfaces eliminate moisture-trapping areas. This reduces corrosion and lowers maintenance costs. When we have to refinish a transformer, the Space-Miser design helps us to do a better job, faster, because all surfaces are easily reached."

"New, streamlined Space-Miser cuts maintenance...

transformer corrosion in network installations reduced, even during city's ice-control program,"

says Rochester Gas & Electric Corporation

Each year, the fight of many cities against winter ice and snow creates big problems for the network. Salt and chemicals, the city's weapons against the hazards of winter, mix with snow and ice to form corrosive slush.

Network transformers—though hidden from sight in subway installations—are highly vulnerable. In addition to normal weather moisture, slush from streets and sidewalks runs into these vaults. Westinghouse Space-Miser network transformers are especially designed to shed corrosive debris and provide many other new advantages.

LESS MAINTENANCE TIME, COST—New, smooth contour tank design with Yukon Coolers eliminates sharp edges and debris- or water-collecting areas. Streamlined design makes cleaning easier, repainting simpler.

PROTECTION AGAINST PARTIAL VAULT FILL-UP—Space-Miser design reduces height 12 inches, allows off-the-floor, I-beam installation to keep transformer out of debris.

LOWER INSTALLATION COSTS—New design reduces weight and volume by 20%, permits faster, easier installation, safer handling.

EASY ACCESS TO HIGH-VOLTAGE TERMINAL CHAMBER—Lowered switch and terminal compartment makes sharp cable bends unnecessary. Extra four-inch width in chamber simplifies forming and connecting high-voltage cable.

For the complete Space-Miser story call your Westinghouse sales engineer . . . or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-70813

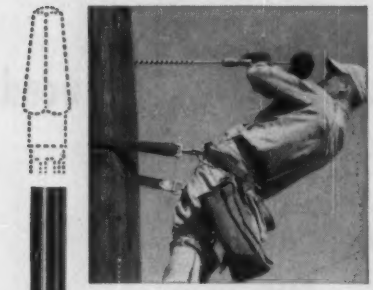
YOU CAN BE **SURE**...IF IT'S

Westinghouse

Mr. Leon G. Atkinson, Assistant Superintendent, Line Maintenance Department, Rochester Gas & Electric Corporation, supervises installation of new Westinghouse Space-Miser network transformer.

New adapter shank bit

fits either hand brace or power drill



Taper square shank fits hand braces

Cut off taper and use "hex" shank in both power drills and hand braces

Cut your wood bit inventory by 50%

Now you can eliminate the need to stock two types of wood auger bits. Irwin's new Adapter Shank Bit fits both hand braces and power drills.

With hand braces, use the Adapter Shank Bit as it comes. Cut off taper square and the Adapter Shank, with its 6 "hex flats", chucks perfectly in power drills or hand braces, either one. No wobble, no run-out. Clean, efficient cutting action. Reduces inventory and record keeping by 50%. Saves time on the job, too. Call your distributor, or write today for complete information. Sizes 4/16" to 17/16", both solid center and single twist types.

***All Irwin Adapter Shank Wood Bits** are forged in one piece from special steel and heat tempered full length for longer life. Plastic coating on balanced cutting heads guarantees factory-fresh sharpness, unequalled performance. Widely used by utilities, electricians and construction workers.*

IRWIN auger bits • screw drivers

Wilmington, Ohio

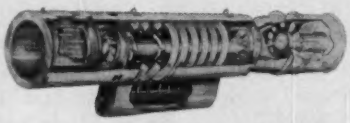
Repulsion Start Motors . . .

rated 1 to 5 hp in frames 182 through 254U, are interchangeable with capacitor start and small polyphase motors of the same ratings. These single-phase induction motors can repeatedly start heavy loads with low current and minimum light flicker and are widely used for heavy duty applications.

Wagner Electric Corp, 6400 Plymouth Ave, St. Louis 14, Mo.

Dust Collector . . .

needs much less space but removes dust particles of 5 microns or over with more than 99% efficiency. 4,000-cfm unit weighs 550 lb, uses 1.6 gpm, has 21-in. diam.,



and measures 100 in. overall, excluding the axial flow fan. 48,000 cfm unit weighs 2,500 lb, has 53-in. diam., and, without fan, 220.25-in. overall length.

Intake air travelling 4,500 to 6,000 lfm impinges on a water film in the mixer section. Cyclonic separator removes water-entrained dust by centrifugal action. Sizes with capacities from 2,500 to 64,000 cfm are available.

Joy Mfg Co, Henry W. Oliver Bldg, Pittsburgh 22, Pa.

Distribution Arresters . . .

in 3 and 6-kv ratings are additions to the Magne-valve line. Units come in either external gap type or direction connection type with ground lead disconnect. Magnetic action valve type arresters cover range to 121 kv for line type models and 254-kv for station type models.

General Electric Co, Schenectady 5, N. Y.

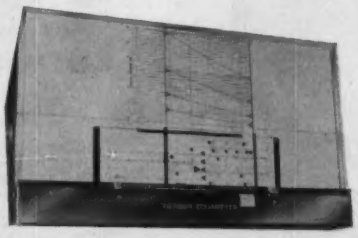
Shaded Pole Motors . . .

with exceptionally long life are offered in sizes from 1/40 to 1/500 hp. Known as the 402 series, they have a "Camel Bearing" whose packing retains lubrication for prolonged periods. Motors operate on 115-v, 60-cps supply. Standard mounting holes make them interchangeable with other motors. Series includes six sizes, with clockwise or counterclockwise rotation, in standard or long-life models.

Controls Co of America, Milwaukee 45, Wis.

Manual Computer . . .

does harmonic analyses and curve fittings on plotted or recorded curves. The Model GEQ-450 Equameter analyses a curve in a Fourier series, power series, or othogonal polynomials (least square fits). It produces deriviative or integral equations directly from a curve. Equations are recorded on specially designed data sheets. Operator needs little or no mathematical background to operate the Equameter. Working surface is illuminated from below.



Equameter can convert raw data to form acceptable for digital or analog computers, will produce 12-term Fourier analysis in about seven min. Maximum vertical amplitude is 5.9 in. for cycle span of 9 in. horizontally. Longer curves may be sub-divided.

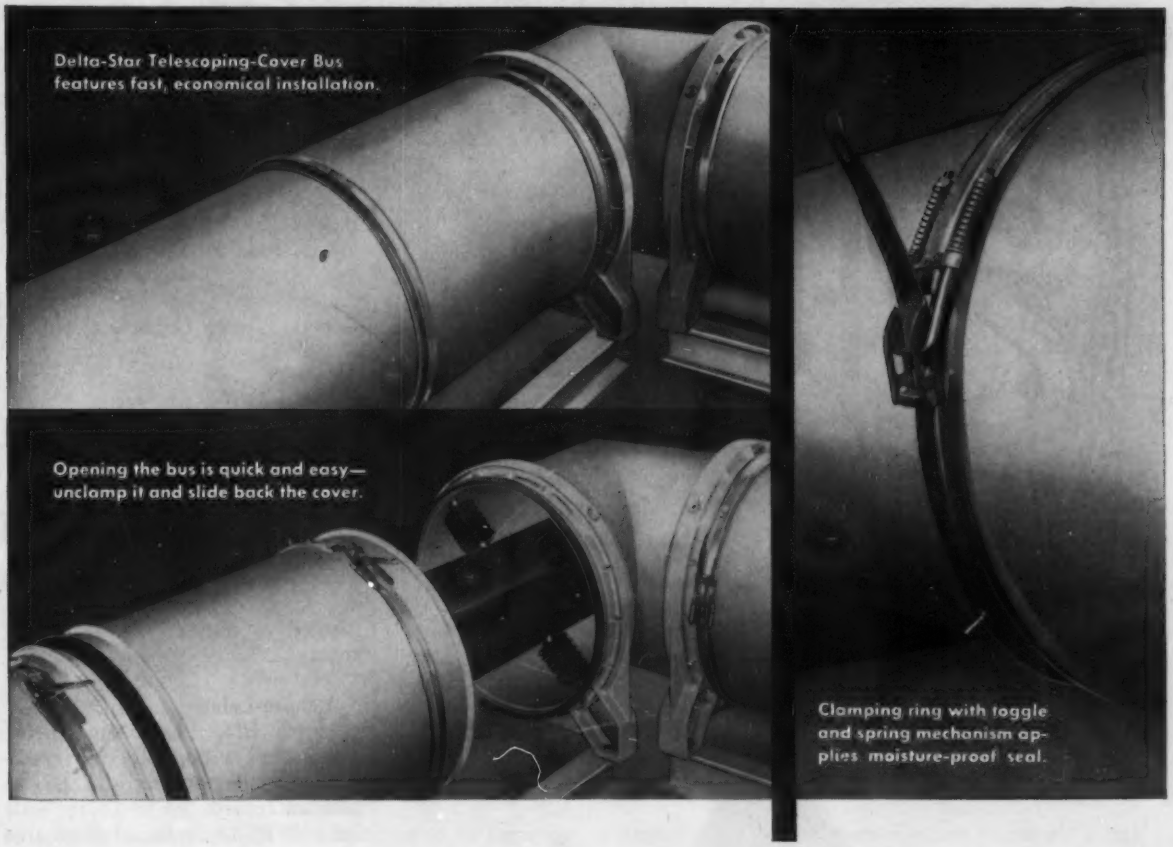
Gerber Scientific Instrument Co, 162 State St, Hartford 3, Conn.

Radiant Baseboard . . .

has over 91% radiant efficiency. It produces heat that is all-radiant and free from convection currents. Manufactured in 600, 1,000, and 1,500-w ratings, the units are 2 in. wide and 8 in. high. Dual voltage feature permits use on either 120 or 240 v circuits.

Ampere Industries, 60 Boston St, Newark 3, N. J.

(*More New Equipment on page* 114)


Delta-Star Telescoping-Cover Bus features fast, economical installation.
Opening the bus is quick and easy—unclamp it and slide back the cover.
Clamping ring with toggle and spring mechanism applies moisture-proof seal.

When you're thinking about cost reduction, check Delta-Star's Telescoping-Cover Bus

From installation to maintenance you reduce time and costs with Delta-Star's telescoping-cover isolated phase bus.

Installation is greatly simplified—for speed and economy. Longitudinal sections 6 to 8 ft. long can be preassembled and delivered in lengths as large as your facilities can handle. Telescoping covers clamp into position—are locked together with a toggle and spring clamping mechanism—no bolts needed. Clamping rings with fully-trapped, self-sealing neoprene gaskets make the bus as water-proof as it is possible for a gasketed bus to be. Gasketing is at a minimum—no longitudinal gaskets required.

Telescoping-cover bus sections can be opened and inspected without tools—*in just a few minutes.* A 2 ft. 6 in. opening allows ample room for inspection and cleaning.

Current-carrying ability and minimum-heating characteristics of the telescoping-cover bus proved out very well in tests and in use.

For your new bus runs—or replacements—be sure to check Delta-Star's telescoping-cover bus.

Delta-Star Electric Division
H. K. Porter Company, Inc.
Chicago 12, Illinois
District offices in principle cities

DELTA-STAR ELECTRIC DIVISION
H. K. PORTER COMPANY, INC.

Divisions of H. K. Porter Company, Inc.: Connors Steel, Delta-Star Electric, H. K. Porter Company (Canada) Ltd., Henry Disston, Leschen Wire Rope, Quaker Rubber, Refractories, Riverside-Alloy Metal, Vulcan Crucible Steel, W-S Fittings.

FORGED,
of Course!

STRONGER
TOUGHER
LIGHTER

BTC

Drop Forged
STRAIN CLAMPS

Wide range of sizes • Continuous power path
Efficient, dependable dead-ending for all conductors
Easy and economical to install — no special tools
Specify the best—BTC Hi-Line Hardware

The BREWER-TITCHENER CORPORATION
HI-LINE HARDWARE DIVISION • CORTLAND, N.Y.

Auxiliary Mill Motor . . .

delivers 41% more torque than largest existing d-c motor in MD-600 line. Rated 500 hp (cont. 75C), 340 rpm, the 230-v shunt wound motor is designated the MD 624. Armature and field coils have Class H insulation. Split frame is heavy rolled steel. Pole face compensating windings provide wide speed range.
General Electric Co, Schenectady 5, N. Y.

MORE NEW PRODUCTS

Instrof Corp, Third & Walnut St, Collegeville, Pa., has a "J" type **binder strip** to secure the top edges of expanded steel trough systems supporting instrument wiring and tubing.

Benson-Lehner Corp, 11930 Olympic Blvd., Los Angeles 64, Cal., offers a portable **viewer/editor** for oscillograph records. Device handles records up to 16 in. wide on a 16 by 18-in. back-lighted area and has speeds to 96 in. per sec. backward or forward.

Minneapolis-Honeywell Regulator Co, Industrial Div, Wayne & Windrim Ave, Philadelphia, Pa., offers two types of "Actionater" reversing capacitor-type **control motors** for operating valves and dampers in automatic control systems; M 630 for two-position and floating control; M 930 for proportioning control. Approximately 6 inches in diam and 10 inches wide, units weigh 11 lb and have a selection of timings from 7.5 to 120 sec.

Federal Pacific Electric Co, Eastern Switchgear Div, 888 N. Keyser Ave, Scranton, Pa., has available colored **indicator lamps** in several colors for power switchboards. Used with resistor, 24-v lamp will operate in circuits up to 250 v.

General Electric Co, Schenectady 5, N. Y., offers a CR7050 part-winding **starter** which provides two-step increment starting for compressors, fans, pumps and blowers in large buildings where reduced kva inrush is required.

Are you missing something in Electrical World?

You are now reading the NEW end-product of 82 years of publishing service to the electric power industry. We'd like to think it's perfection itself, but we know better. It's only as good as we can make it, and it probably won't even retain its present format for any great length of time, if past experience with our readers is any criterion. For Electrical World, now, is as accurate an answer to your wants and needs — in total, the requirements of our industry — as we can make it. *When those requirements change, so too will Electrical World.* But to make sure that you get from our new make-up everything that's been put here for you, let's take a fast tour of the changes we've made.

Right now, have a look at the complete, compact, 2-minute summary of the book, printed on special yellow stock at the front. Here is *the gist* of what's going on in the industry! "Newscope" covers future and late news; "Electrical Week" examines events, generation, distribution, commercial, management, people, manufacturing, and new equipment; "Engineering Trends" briefs *that* aspect of issue content. This specially written summary in the front of each issue, on yellow stock for easy finding, gives you *the complete overall picture of the industry and everything affecting it for the past week!* It mirrors the contents of each issue for absorption almost at a glance — let's you invest your Electrical World reading time more profitably.

Then there's the *second* yellow-stock insert, at the back of the book. In this one you'll find our exclusive "Electrical Business Outlook." We believe (because you've told us so) that our "EBO" page, as it's coming to be known, is *the best interpretation of what is important to management to be found in the industry.* Accompanying Electrical Business Outlook will be the statistics — the weekly output chart, as well as power and general business statistics. Here you'll see industry progress defined as it takes place, by the week, in terms of capacity, peak load, production, power sales and customers, accompanied by general business statistics for easy comparison. Too, you won't want to miss the special page, "Atomic Progress," a rapid-reading view of latest developments on the nuclear power front. And in "newsletter" form, treatment of the problems management is constantly concerned with: Financial, Rates, Regulation, Public Relations, and Industrial Relations.

Larger type throughout the whole book is the order of the day, dictated like all other changes by the very real need for a faster, more efficiently read weekly magazine. With all this will come a new, more complete, more descriptive Contents Page; a Publisher's Column, to keep you informed of coming editorial features and new services; "Washington" will appear as a new, every-week run-down on the industry scene in the capitol. *Put all this on a firm foundation of the most complete, intensive reporting coverage available to any business publication, and you'll see why, more than ever before, Electrical World has earned the right to be known as . . .*

"The Electrical Industry's Weekly Magazine"

Choose from Two NEW HOMELITE CHAIN SAWS...

the 6-Horsepower "Power Twins"

The Homelite EZ-6
DIRECT DRIVE CHAIN SAW

Fastest-cutting direct-drive chain saw made, the 6 horsepower of the EZ-6 makes quick work of trees up to 5 feet in diameter. Famous Floating Power and a light 19 pounds make the EZ-6 easiest of all to handle. Ideal for clearing building sites, repairing storm damage, maintaining rights-of-way.

EZ 6

6 HORSEPOWER
19 LIGHT POUNDS

The Homelite 6-22
GEAR DRIVE CHAIN SAW

Most versatile chain saw you can own, the 6-horsepower, 22-pound 6-22 does everything. Brings down big trees, up to 7 feet in diameter. Built to rugged professional standards, the smooth-operating 6-22 stands up under the grind . . . day in and day out. Money-saving attachments convert the 6-22 in seconds to plunge-cut bow, brush-cutter or clearing attachment. Does any woodcutting job for contractors, road builders, utilities, tree surgeons, park commissions.

6 22

6 HORSEPOWER
22 LIGHT POUNDS

WIN A FREE CHAIN SAW EVERY YEAR FOR LIFE... IT'S EASY!

Nothing to buy, nothing to write, no obligation. Just have a free demonstration of the new Homelite Power Twins. You may have three chances to win! GRAND PRIZE: a free Homelite chain saw every year for life, PLUS 25 chain saws given away by Homelite District Offices, PLUS hundreds of chain saws being awarded by Homelite dealers in their own local contests. Register now! Limited to residents of the United States and subject to local state, county and city laws.

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Homelite Builds and Sells More Chain Saws than any Other Company in the World
Manufacturers of Carryable Pumps • Generators • Blowers • Chain Saws

ELECTRICAL BUSINESS OUTLOOK

Electrical World
JULY 8, 1957

Industrial production has now hit the summer doldrums and will remain there for the next few months. Even so, most major industries managed to show moderate gains in output for the first six months of '57. Petroleum, chemicals, and even autos are up about 2-3%. The big gainers aircraft, railroad equipment and office machinery are running 15% or higher than the rate of production in the first half of last year.

Manufacturers of electrical apparatus aren't hurting either. Production for the first half of this year ran about 8% over a year ago. New orders are off, but back orders for heavy apparatus are still substantial. And planned capital expenditures in electric utilities (almost $4.8 billion this year) indicate an even larger volume of heavy electrical equipment will be shipped in the next six months. Total output for 1957 will top '56 about 10%.

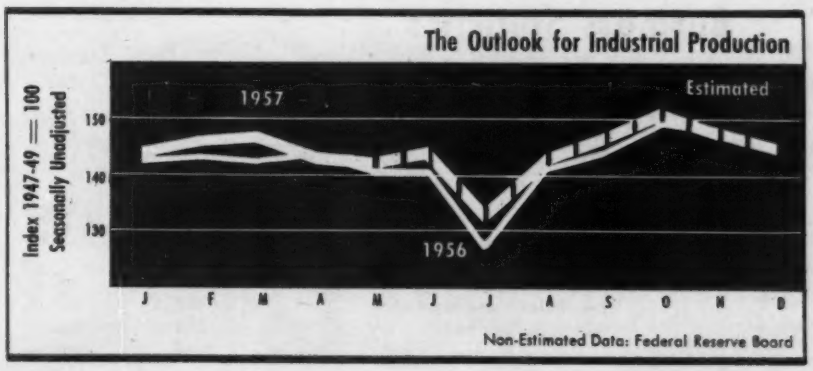
Appliance output for '57 will trail last year's record by some 10%, judging from the disappointing output of major devices since the first of this year. Compared to January-June totals for 1956, washers and ranges were off 25%, refrigerators off 12% and vacuum cleaners off 3%. Even big growth appliances—dishwashers, air conditioners and freezers—are lagging. Most of this ties in with the slump in housing completions and the fact that real per capita income, after taxes, has not been gaining this year.

Hope wanes for avoiding another price-wage go-round. The $6 per ton steel increase will influence pricing structure of a whole industrial complex. It's bound to upset the relatively stable price picture of the past few months.

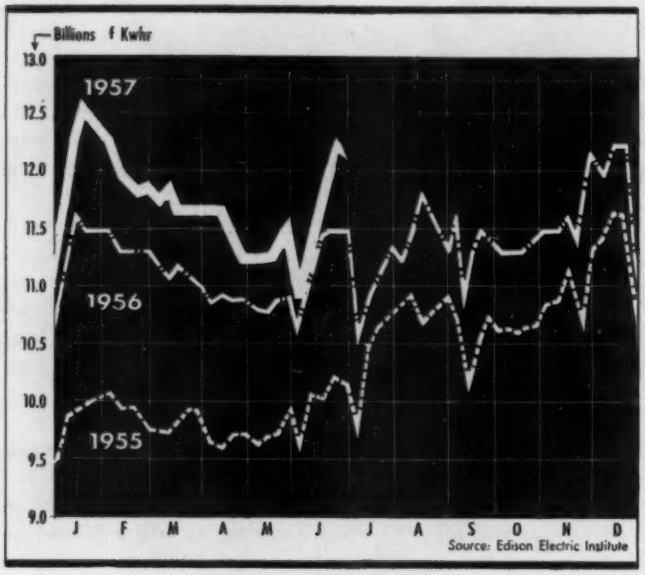
Full impact of the steel increase won't be felt for a while by electric utilities. But you need only review the price boosts on equipment which followed last year's $8.50 a ton increase to gage the probable effect. In 1956, prices on many electrical items went up between 5 and 10%.

General Electric's boost of turbine prices may well set the pattern. GE increased large and medium steam turbine-generator units some 5%; mechanical drive turbines about 7½%; and gas turbines, about 10%. Observers say the higher prices stemmed, at least in part, from the anticipated 4% steel hike.

Other factors that virtually cinch price adjustments are familiar to you—new high in cost of living, manufacturers' increasing production costs, and expected increases in cost of materials other than steel.



STATISTICS



OUTPUT

Week ended June 29,
12,111,000,000 Kwhr
Up 5.3%

Per Cent Change From Previous Year

	June 15	June 22	June 29
Total U. S.	+4.7	+ 7.5	+ 5.3
New Eng.	+4.0	+ 8.3	+ 8.0
Mid. Atlan.	+3.3	+11.2	+ 7.9
Cent. Ind.	+1.2	+ 2.9	+ 2.4
West Cent.	+2.4	+ 0.1	− 0.6
Southeast	+8.1	+10.9	+ 7.2
South Cent.	+9.3	+ 9.5	+ 0.2
Rocky Mount	+1.5	+ 3.4	+ 6.6
Pacific			
NW	+6.8	+ 7.7	+ 8.5
SW	+6.3	+11.0	+10.8

Seasonally Adjusted Index 232.1
Week Ago 235.5
Year Ago 221.0

Atomic Energy Commission requirements—1,150,000,000 Kwhr (Electrical World estimate). Excluding AEC, output increase was 5.7%.

Power Statistics . . .

		Latest Month	Preceding Month	Year Ago	Annual Change %
Capacity	April	122.27	121.78	116.78	4.7
Peak—Class 1 Systems (million kw)	April	97.7	98.0	91.6	6.7
Estimated Dec. '57 Peak (million kw)	April	113.6	113.5	114.1	− 0.4
Production—billion kwhr	April	50.67	52.45	47.49	6.7
Hydro		12.05	11.44	11.55	4.3
Fuel		38.62	41.01	35.94	7.5
Sales—billion kwhr	Mar.	47.75	47.78	45.36	5.3
Residential		13.47	14.25	12.46	8.1
Commercial		7.35	7.49	6.84	7.5
Industrial		24.44	23.65	23.70	3.1
Other		2.49	2.40	2.35	6.0
Fuel Consumption	April				
Coal—million tons		12.50	13.84	11.95	4.6
Oil—million barrels		6.47	6.57	5.76	12.3
Gas—billion cu ft		98.80	93.15	89.72	10.1
Net Income Class A & B Co's—$ million	Mar.	126.81	142.34	116.86	8.5
Residential Customers—millions	12 mos.	45.99	45.92	44.67	3.0
Revenue per kwhr	ended	2.59¢	2.59¢	2.63¢	− 1.5
Avg kwhr per customer	Mar. 31	3,021	3,004	2,820	7.1
Avg annual bill		$78.23	$77.80	$74.17	5.5

Business Statistics . . .

Indexes: 1947–49 = 100					
FRB Industrial Production	May	143	144	141	1.4
ENR Construction Cost	June	151.2	150	145.1	4.2
BLS Cost-of-living	May	119.6	119.3	115.4	3.6
New Orders for Machinery (1950 = 100)	April	147	159	149	− 1.3
NEMA Sales					
Insulation materials	April	145	153	163	−11.0
Electric appliances		83	97	111	−25.2
Wholesale prices	April				
Motors and generators		141.4	140.7	130.4	8.4
Transformers and regulators		147.4	147.4	135.3	8.9
Switchgear and fuses		164.4	164.4	149.0	10.3
GNP—annual rate—$ billion	1st Qtr.	427.0	423.8	403.4	5.9%

MANAGEMENT BULLETIN

FINANCE

Because of the holiday last week, only two electric utility companies floated new securities, totaling $55 million. The first was an issue of $40 million Southern California Edison Co first mtg 4¾% bonds (Aa) due 1987 which was won by an underwriting group headed by Halsey, Stuart & Co with a bid of 99.83%. Reoffering was at 100.73% to yield 4.70% to the public. The other issue was a $15-million Rochester Gas & Electric Corp bond sale, the details of which are reported on page 21.

Secondary offerings: Blyth & Co offers 12,500 common shares of Louisville Gas & Electric Co at $28 a share . . . Blyth & Co and Merrill Lynch, Pierce, Fenner & Beane group wins 265,000 common shares of Duquesne Light Co at $32.512 a share. Stock was owned by Stand Shares, Inc, which now holds, after this sale, 302,750 shares of Duquesne's 6.6 million shares of outstanding stock. Group is offering the stock at $34 a share.

Private sale: Empire District Electric Co places privately $3 million first mtg 4⅞% bonds due 1987 through First Boston Corp and G. H. Walker & Co.

Stockholder subscription: A total of 159,298 common shares of 166,997 offered by the Public Service Co of New Mexico on 1-for-10 basis at $13.50 a share was taken via rights. Remainder of 7,699 was sold by the underwriters.

SALE OF PROPERTY

Potomac Edison Co is planning to sell its transportation system. . . . Kendallville, Ind., citizens vote 1,029 to 838 to sell its electric distribution system to Indiana & Michigan Electric Co for $1,181,500.

Utilities ask to swap properties. In joint application Arkansas Power & Light Co and First Electric Co-operative Corp., Jacksonville, Ark., ask PSC approval for the co-op to trade a portion of its Jacksonville and Bryant service areas to Arkansas P&L in exchange for franchises in the towns of Ward and Austin.

LEGISLATION

California: House rejects bill to curb PUC powers. It would have restricted the authority of the state commission in fixing utility rates. House sent the measure, which had been approved previously by the Senate, to an interim committee for study.

Florida: Gov LeRoy Collins signs bill designed to permit the taxation of municipally-owned utilities when they operate in competition with private companies. Said Collins: "I feel that under the American system of free enterprise and our constitution it is but fair and right that tax immunity should not go beyond normal and reasonable municipal use."

Pennsylvania: Legislature passes bill requiring that the state reimburse public utility companies for the cost of moving their facilities when necessitated by federal-aid highway construction.

Vermont: Ways and Means Committee of the House is now preparing a bill which will double the electrical energy tax from ½ mill per kwhr of electricity manufactured in Vermont to one mill. It is estimated this would yield $900,000 in additional biennial revenue.

COURT RULINGS

Right of natural gas pipeline companies to make "below cost" sales to industrial consumers has new court backing. National Coal Association had challenged the FPC's action in authorizing Northern Natural Gas Co to sell gas for use under boilers at a Northern States Power Co generating plant. NCA claimed such industrial "dump" sales should be prohibited as wasteful use of a precious resource. However, U. S. Court of Appeals for the District of Columbia upheld

the proposed sale on grounds it will lower the pipeline's unit costs—and benefit power consumers.

Property sale suit dismissed. Madison County Court of Common Pleas Judge Gerald A. Baynes, London, Ohio, approves sale of the electric facilities of the Plain City Municipal Light & Water Works to the Ohio Edison Co, by dismissing a taxpayer's suit. He sustained the contention of the village and the utility that the Ohio legislature did not have the power to regulate the method by which the village chose to sell its electric utility. They contended also that the taxpayer failed to claim or allege any damage, and thus lacked the capacity to sue.

Free electricity can be supplied. Ohio Supreme Court, in an unanimous decision, ruled that a village can supply free electricity to its water department and for street lighting, as long as village rates are reasonable, so that consumers cannot complain about the free service. Decision affirmed Richland County Court of Common Pleas ruling for the village of Shiloh, which buys electric power from the Ohio Power Co for distribution to users.

EMYLOYEE RELATIONS

Here are some recent wage settlements: Pennsylvania Power & Light Co, 5 to 15¢ an hour increase; 6,000 white collar employees of the Tennessee Valley Authority, 5.1% hike; Long Island Lighting Co, 5.1875% increase; and San Diego Gas & Electric Co, 5.6% hike.

TAXES

Another tax goes onto electric bill. Martinsville, Va., City Council adopts an ordinance calling for a $1 tax to be added to all monthly electric bills beginning July 1, the proceeds from which will aid in paying off the school bond issue recently approved by the electorate.

A proposed increase in the city utility bill tax from 5% now to 9% was turned down by the Richmond, Va., City Council.

MEETINGS

Southern Co system will spend $436 million in new facilities in 1957-1959, James F. Crist, vice president, told a regional meeting in New York recently. Of this amount, he declared, $140 million will be spent in 1957 . . . At the Electric Bond & Share annual meeting in New York, Pres George G. Walker said that Ebasco Services, Inc, backlog of orders was up almost 15% over a year ago and 4% over the end of 1956. In the first five months of 1957, he pointed out, Ebasco has added 64 new clients never previously served . . . American & Foreign Power Co system will spend $98 million in 1957, Pres Henry B. Sargent told a regional stockholders meeting held in New York recently.

PUBLIC RELATIONS

A booklet "Your Guide to . . . Wild Shores and Good Fishing" has just been published by Wisconsin Public Service Corp. Purpose: To help fisherman explore the scenic bays, channels, points and islands created by the waters of the Peshtigo River impounded by the dams at Caldron Falls and High Falls. These dams and lands surrounding their flowages "are the property of WPS. In keeping with our name 'Public Service', we have set up a program to develop these lands for the recreational benefit of the public," the booklet said.

A wallet-sized card giving 15 "Quick Facts" about Puget Sound Power & Light Co met with such a response that the initial printing of 5,000 was quickly exhausted and 15,000 more ordered immediately. One side of card bears a map of the system, showing division and local offices and location of Upper Baker Dam now under construction. Other side cites capacity of each generating plant, number of employees and customers and other factual info.

Cable insulated with G-E silicone rubber increases capacity of existing conduit, reduces danger of heat failure

You can provide for future load increases and protect against temporary overloads without using larger conductors . . . because power cable insulated with G-E silicone rubber carries *up to 50 percent more current* than the same size conventional cable. This means you can often replace old cable with higher-capacity silicone-rubber cable without ripping out existing conduit.

Power cable insulated with General Electric silicone rubber has long service life at operating temperature of 125°C. — particularly important during "heat storms" when summer heat both increases system loads and raises earth temperatures, making normal heat dissipation more difficult.

Besides outstanding high-temperature performance, General Electric silicone rubber gives you the best combination of properties needed in cable insulation: It has low moisture absorption. It has the best resistance to ozone of any flexible insulating material. It stays flexible at very low temperatures. No special tools, fittings or terminations are needed. Tests prove that silicone rubber lasts longer than other insulation.

For more information—and the names of suppliers of generator leads, power cable and station control cable insulated with G-E silicone rubber —write: General Electric Company, Silicone Products Department, Section E4L7, Waterford, N. Y.

Progress Is Our Most Important Product

GENERAL ELECTRIC

Silicone Products Department, Waterford, New York

NEWEST REASON WHY ALL TRANSFORMERS ARE NOT ALIKE

New service-continuity watchdog

New breaker, new operating-handle sequence, and valve-type arresters assure maximum service continuity with General Electric self-protected distribution transformers

With the use of self-protected transformers steadily increasing, General Electric has developed a new breaker and a new reset handle to help utilities maintain the best possible service, especially in overload areas. The breaker provides simultaneous opening of all contacts, and the new reset handle virtually eliminates unintentional opening of the breaker by linemen.

Designated "T-2", the new breaker is used on all self-protected G-E transformers rated 37½ kva and above, together with G.E.'s dependable, long-life Magne-valve arresters

and internal fuses. Twenty per cent shorter than other types of breakers for similar application, the new breaker helps keep tank heights down.

Reduces chance of feedback burnouts

One driveshaft, common to all contacts, operates all breaker poles simultaneously. It is impossible, therefore, for the contacts to open on one line only. This eliminates the possibility of damage to motors due to undervoltage through a single closed contact and connected load.

Helps eliminate unintentional opening

Following the unique operating sequence, the lineman merely moves the handle *down* against the stop in the "closed" position to reset the signal light. So there is no possibility of accidentally tripping the breaker. It is also possible for the lineman to test the overload lamp without removing it—another unique feature.

Emergency device provides for 15% overloads

Uprated at the factory to carry an additional 20% of load before tripping out, the new breaker also includes an emergency overload device. In a few seconds the lineman can raise the trip temperature, permitting the transformer to carry an additional 15% of load before the breaker trips. This makes it possible to maintain service to the customer until the power company can replace the transformer with a higher-rated unit.

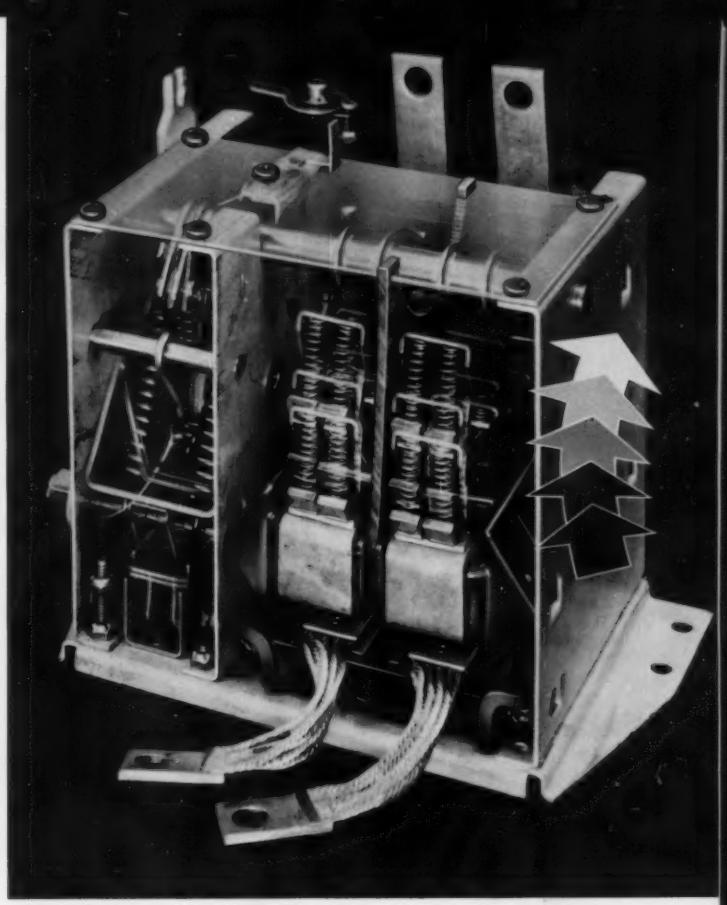
All transformers are not alike

The new circuit-breaker and new reset handle sequence are just two of the main advantages of General Electric distribution transformers. Others include *Formex* wire* to increase reliability and cut tank size, *Nitrile rubber gaskets* to give superior sealing, *Strenicor clamps* to prevent terminal breakage, and many others—evidence that all transformers are not alike.

For complete information contact your nearest G-E Apparatus Sales Office or G-E Agent—or write to Section 431-49 General Electric Company, Schenectady 5, New York.

LIVE BETTER ELECTRICALLY

*Reg. Trademark of General Electric Co.



IT IS IMPOSSIBLE for contacts to open on one line only. For with the G-E design, one driveshaft operates all poles simultaneously.

NO ACCIDENTAL TRIPPING is possible with G.E.'s unique new operating sequence for breaker reset handle. Lineman merely moves handle *down* against stop in "closed" direction to reset light.

Progress Is Our Most Important Product

GENERAL ELECTRIC

"Stocked for Immediate Delivery"—can be music to the ears of your production design engineers or purchasing agent.

Out of thousands of styles and sizes of fine-silver headed rivets as specified in customer orders came a list of 70 standard size contacts most frequently used. All 70 *standards* are "Stocked for Immediate Delivery" at Mallory.

For your new designs . . . check the Mallory "preferred list" for a size to fit your job. A Mallory standard can save engineering time . . . assure economical cost and prompt delivery when you go into production.

For your existing production lines . . . check the Mallory "preferred list" for a size closely matching the contacts you may now be purchasing on special order. A change to a Mallory standard may enable an appreciable cost savings on current and future production runs.

Write . . . or ask the Mallory representative for your copy of the Mallory Contact Division brochure 3-15A. It contains a complete stock list, dimensions, and pricing information.

Serving Industry with These Products:

Electromechanical — Resistors • Switches • Tuning Devices • Vibrators
Electrochemical — Capacitors • Mercury and Zinc-Carbon Batteries
Metallurgical — Contacts • Special Metals • Welding Materials

P. R. MALLORY & CO. Inc.
MALLORY
P. R. MALLORY & CO. Inc., INDIANAPOLIS 6, INDIANA

Sangamo Tells Policy on Polyphase Meters

New polyphase meters to have same connections as previous design. Single meter proposal studied for future possibilities.

The new line of two-stator meters, announced by the Sangamo Electric Co at the St. Petersburg meeting of the EEI-AEIC Meter and Service Committees, will be made with the same connections and the same relative ratio of constants as has been standard in the past.

It was proposed at this meeting that a variation in the present connections and ratio of constants for polyphase meters might provide one meter that could be used both on 4-wire wye and 4-wire delta service. Although there was no formal expression of opinion by the group, many users pointed out the difficulties involved in retraining and re-educating service installers, meter setters and testers, and others associated with the installation and testing of polyphase meters. Many agreed that the proposals made would permit the reduction of stocks, would improve the flexibility of operation, and other future economies.

This proposal, following in principle the suggestions of C. V. Morey of the Consolidated Edison Co and W. H. Farrington of the Texas Electric Service Co, would require certain changes in practice by meter users; and the advantages of the single meter for use on different types of circuits will have to be weighed against the complexities of change in procedure. It is to be hoped that closer study of these proposals will indicate a trend toward general acceptance, as it is only through general acceptance of a single meter for wye-delta service that the full economies can be attained.

Although the Sangamo Electric Co is proceeding with a new line of two-stator meters meeting present industry standards, they hope that a future study by the users of this equipment will lead to general acceptance of a multi-purpose polyphase meter with resulting future economies.

They have also indicated that they are ready to produce meters as proposed should the industry's requirements make the development economical.

Chance Co Celebrates Golden Anniversary

A. B. Chance Co in Mid-June celebrated its Golden Anniversary coincident with the 100th anniversary of the city of Centralia, Mo., location of the Chance Co headquarters and main plant.

F. Gano Chance, president and board chairman, outlining the history of the company, recalled its earlier days and the founding of the first plant in an old church house. From this start of manufacturing telephone accessories, the business has progressed to the point where in 1956 about $2.5 million of the income of Centralia was the A. B. Chance payroll.

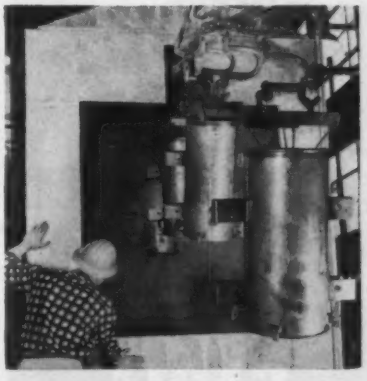
In the past 25 years A. B. Chance has acquired nine companies and founded a Canadian subsidiary. Since 1946 sales increased from $3.8 to $19 million in 1956. F. Gano Chance predicted that in 1966 sales would amount to $50 to $60 million resulting in increasing the sales personnel by 125 and doubling the factory force, raising total employment to some 2,500 persons.

Principal products of the company are earth anchors, hot-line tools, pole line hardware, grounding equipment, connectors, insulators, electrical porcelain, crossarms, in fact, almost everything for the power lines but the birds.

Allis-Chalmers Designs Turbine Turning Gear

Allis-Chalmers has produced an underslung two-speed turning gear for steam turbine units rated 100 Mw and above. Built into the pedestal at the side of the turbine centerline, the unit need not be removed during turbine servicing.

By rotating the spindles of the 1000 F or 1050 F turbines during preheating, rolling, or cooling, they, along with the casings, are kept uniformly heated by an agitation of hot vapor. The gears' two-speeds provide 3 rpm for starting and higher rpm for rolling. The speeds are obtained by a single-speed reversing motor, two free-wheeling clutches, and two gear trains. When idle the drive pinion is manually engaged while it automatically disengages as the shaft accelerates with steam.



Automated Process Paints L-M Transformer Tanks

Round-Wound distribution transformer tanks are now painted by an automated process at Line Material's Zanesville, Ohio, plant.

The process called vapor-chamber flow-coating, is believed to be new to the field of outdoor electrical apparatus. Costing over $100,000 for installation, the process provides surface preparation, drying, paint application, and curing in approximately 5 hr.

(*More M &M on page* 126)

*Versatility

*Is the middle name of the Neale Model "K" pull type spinner . . .

- Spins new and existing cable
- Has instant adjustment from minimum to maximum cable sizes
- Spins one or two spirals
- Lashes one, two or three cables at one time
- Uses all sizes and types spinning wire
- Weighs only 36 pounds

THE MODEL "K" IS TRULY A VERSATILE CABLE SPINNING MACHINE

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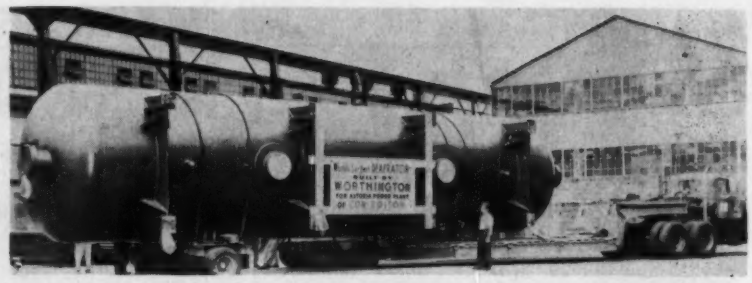


Large Deaerator Shipped to Con Edison

The deaerator shown here is enroute to Consolidated Edison's Astoria, Long Island plant. There it will be used to heat and deaerate the boiler feed water of the No. 3 steam electric generating unit.

Built by Worthington Corp at its Harrison, N. J. plant, this reportedly largest deaerator will be capable of heating nearly three million pounds of water per hour to 370 F. While heating the water, the deaerator will lower its oxygen content to less than seven parts oxygen per billion parts water. This is to protect the high pressure boiler against corrosion.

When fully assembled the deaerator will weigh over 80 tons. It had to be fabricated and transported in two sections. The storage tank was X-rayed over 700 times to assure its ability to withstand pressures of 200 psi.

Dravo Dedicates Plant

Dravo Corp dedicated its $500,000 Research Center on Neville Island, Pittsburgh, Pa. Housing centralized facilities for the Research and Development Dept., the T-shaped structure is located on a two-acre plot and is adjacent to the company's main plant.

Wood Preservative Use Increased in 1956

Volume of wood treated with preservatives increased 2.5% during 1956, according to a survey made by the Forest Service in cooperation with the American Wood Preservers' Association, the U. S. Department of Agriculture announced.

Some 254.6 million cu ft of wood was treated during 1956 as compared with 248.4 million cu ft in 1955. This is a preliminary report based on figures from 310 of the 345 known wood-treating plants in the country, and represents most of the output of the wood preservation.

About 152.6 million gal of creosote were used for wood preservation in 1956, a 1% increase over 1955. Pentachlorophenol use increased 25% to 13.1 million lb to keep the lead among solid preservatives. Second and third most used solids are chromated zinc chloride and Wolman salts.

Increased use in preservatives occurred in treatment of poles, piling, and switchties. Fewer crossties and fence posts were treated. Accompanying table shows some products treated in 1955 (final report) and 1956 (preliminary report).

Wood Products Treated With Preservatives

Products	1955	1956
Crossarms, number	4,897,693	5,313,655
Crossties, number	26,688,236	26,092,044
Fence posts, number	23,765,647	18,239,891
Piling, linear ft	20,820,272	25,569,280
Poles, number	5,485,047	5,835,176
Lumber & timber, bd ft	473,198,544	482,383,892

Highway Trailer Helps Develop Earth Borer

Recently unveiled at field tests was a demountable earth boring machine developed jointly by the Signal Corps and Highway Trailer Co of Edgarton, Wis.

This machine can be removed from the truck when not in use allowing the vehicle to be used for other purposes. Powered by a hydraulic fluid 56 hp motor, the machine also employs hydraulic controls. Holes from 9 to 30 in. in diam, up to 10 ft in depth can be dug by this earth borer which also has an attachment to handle pole setting.

Meter-Relays to Actuate Radiation Monitoring

Contact meter-relays have been incorporated in a radiation monitoring system for the nation's first nuclear power plant at Shippingport, Pa. They will serve to combine a constant visual indication of prevailing activity with easily adjusted preset limits of radiation. These devices, designed to actuate alarms and solenoids, are manufactured by Assembly Products Inc, Chesterland, Ohio, and are built into the Westinghouse monitoring system.

Function of the system will be to prevent harmful radioactive material from entering the atmosphere. If radiation levels in the selected areas exceed the preset limits. alarms will be actuated by contact meter-relays. If contamination is detected in the air systems being monitored, the meter-relays will also actuate solenoids. These latter in turn will operate butterfly valves to stop the circulation of air. Detectors used include GM tubes, ionization chambers, and air particle detectors.

U. S. Aluminum Production

Primary aluminum production in the U. S. amounted to 144,789 tons in May. This quantity was an increase of 6,061 tons over April production, but a decrease of 6,011 tons from May, 1956. Total production this year through May was 685,312 tons, a decrease of 29,266 tons from the same 1956 period.

Pictured (left to right) Alfred Scheer, Shaw, Metz & Dolio electrical engineer; George Nejdl, asst. electrical engineer for Shaw, Metz & Dolio; P. R. Ellingson, plant engineer, Johnson Motors; R. S. Terhune, Nelson sales representative.

NELSON

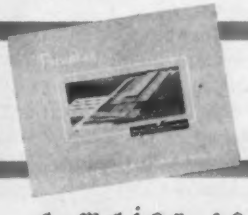
helps make your Johnson outboard motors

Seven Nelson unit substations similar to the one pictured above were used in the new Johnson Motors die cast expansion at Waukegan, Illinois. Each unit, compactly designed for ease of operation and maintenance, controls the flow of power to a section of the plant.

The unit shown is substation No. 3. This is a 1,000 KVA unit, rated 12,000 volt delta primary to 480 volt Wye 277 volt secondary, and incorporating Nelson Class 722 low voltage switchgear. This gear includes 1 — 50,000 AIC main and 8 — 25,000 AIC feeder breakers, and has fully equipped spaces for five additional future feeder breakers.

Thanks to the close cooperation on the part of Shaw, Metz & Dolio, architects and engineers of Chicago, the engineer at Johnson Motors, and the contractor, Aldridge Electric Company with Nelson Electric Manufacturing Company, this installation was made to the *complete satisfaction* of all parties.

When you need any type of electrical control equipment, consult NELSON. The type of team work that made the Johnson Motors installation possible can help you streamline your plant for more efficient operation.



To learn more about Nelson Electric Manufacturing Company please write for pictorial index and brochure describing our new plant.

a major source of electrical control equipment for industry

NELSON *Electric* MANUFACTURING CO.
TULSA, OKLAHOMA

NEWS ABOUT PEOPLE

OTTO W. MANZ, JR

Con Edison Elevates Manz to Exec VP, Meytrott to VP

C. WESLEY MEYTROTT

Consolidated Edison Co of New York, Inc, has announced the elections of Otto W. Manz, Jr, as executive vice president and C. Wesley Meytrott as vice president in charge of sales. The position of executive vice president had been vacant since 1955.

Manz, a vice president since 1954, has been in charge since last year of Con Ed's sales operations in Manhattan, Brooklyn, Queens, and the Bronx, all boroughs of New York City.

The new executive vice president has been with Con Ed since 1925, when he joined Brooklyn Edison, a predecessor, as an engineering assistant. He specialized in field test work until 1940, when he was assigned to the production department. He advanced to a division engineer's post by 1941.

During a leave of absence from the utility in World War II, he assisted Union Carbide & Carbon Corp in constructing an electric generating station for the atomic installation at Oak Ridge, Tenn. After its completion, he remained for two years to direct the operations of both the station and the electric distribution system.

Upon returning to Con Ed in 1946, Manz joined its system operation department. He became its manager in 1950. From that position he rose to assistant vice president in 1954 and was named vice president of purchasing, stores, and fuel later that same year. Manz is an electrical engineering graduate of University of Pennsylvania.

Meytrott, who assumes the VP-sales post formerly held by Manz, has been associated with the utility's sales activities since 1933. At that time he joined New York Edison, another Con Edison predecessor, as a commercial engineer. He has served as assistant vice president since 1953.

Before his association with Con Ed, Meytrott had served in executive sales posts with Florida Power Corp and Ohio Electric Co. He received his B. S. degree in electrical engineering in 1927 from Massachusetts Institute of Technology.

CHARLES E. STRICKLAND

Interstate VP's Strickland

Interstate Power Co has elected Charles E. Strickland as a vice president of the utility and appointed him as district manager of its recently acquired Mason City (Iowa) area.

Strickland comes to his new position from Kansas Power & Light Co, where for the past seven years he has served as vice president in charge of the Peoples' Gas & Electric Division, with headquarters in Mason City.

Strickland entered the public utility field as vice president of United Light & Power Co in Chicago after many years of banking experience. Six years later he became president of Peoples' Gas & Electric Co and the Mason City and Clear Lake Railroad Co.

He is a past president of Iowa Utilities Association and of Missouri Valley Electric Association.

HOW BELL SYSTEM COMMUNICATIONS SERVE THE POWER INDUSTRY

Harry Otten, system operation manager, and the New York areas served by Con Edison

"We've grown up with private line communications"

— an interview with Harry Otten, Con Edison system operation manager

When did Consolidated Edison first start using private line communications?

Back in 1927. It was our first automatic alarm system on certain of our lines. The board is in our operations center, and certain parts are as useful now as they were 30 years ago.

And, of course, your needs have increased since then

Tremendously! We now generate 3,400,000 Kw to serve 8½ million people in the five-county metropolitan area. Naturally, we've had to add to the communications to let us keep pace.

What do these communications include?

Principally, direct telephone communications between our dispatching centers and generating plants, substations and service headquarters throughout the 600-square-mile area that we serve. In addition, Bell System circuits perform continuously many vital functions, such as automatic control and protection, telemetering of load measurements at remote locations, supervisory control of normally unattended substations, etc.

What's the main advantage of these facilities?

First of all, we couldn't operate without them. We think of private line channels as a production tool. Thus, we obtain the advantages of ready availability of new circuits when and where we need them and the backing of an organization trained to design, construct and maintain communication facilities.

• • •

Private line communications can fit into your operation as profitably. Just call your Bell Telephone Company business office. A representative will be glad to make a study of your requirements.

BELL TELEPHONE SYSTEM

PRIVATE LINE TELEPHONE • PRIVATE LINE TELETYPEWRITER DATA TRANSMISSION SYSTEMS • CHANNELS FOR: REMOTE METERING AND CONTROL • TELEPHOTOGRAPH • CLOSED CIRCUIT TV

GE Advances Lilly

Clyde A. Lilly is new manager-marketing for General Electric Co's Large Steam Turbine-Generator Department. He replaces R. S. Neblett, now manager-marketing administration, LST-G department.

Lilly is former manager-user industries sales for Alabama. Since joining GE in 1945 he has also been marketing proposition engineer and sales engineer.

LILLY

Bobo Gets Sales Post

New general sales manager for Federal Pacific Electric Co is Robert L. Bobo, former Great Lakes regional sales manager. His marketing duties will cover all product groups.

Bobo came to Federal in 1954 after 13 years with Westinghouse Electric Corp, where he was manager of the Switchgear Division's switchgear assemblies sales section.

BOBO

PERSONAL BRIEFS

New Lewiston Division manager of Washington Water Power Co is **Ernest W. Hatch.** His successor as Moscow district manager is **John B. Murray .**

Union Electric Co has as its new assistant treasurer **Herbert H. Bindbeutel** . . . The Main Line Division of Philadelphia Electric Co has designated **Thomas W. Coppock** electric superintendent.

Vic Bauer of Pacific Power & Light Co is new industrial development engineer for the Casper, Wyo., area . . . Baltimore Gas & Electric Co has named **Henry B. Kimmey** supervisor-employment, personnel department, and **Alfred I. Zipprian** manager of the public information department.

At Ohio Power Co, **Chauncy C. Linard** was advanced to Valley Division meter superintendent . . . Ohio Edison Co has designated **Harold W. Miller** industrial sales supervisor of the Youngstown Division and **William H. Zinstine** commercial sales supervisor of the division.

Gene B. Hale has advanced from personnel supervisor of American Gas & Electric Service Corp in New York to office manager.

Myron R. Renick has been appointed to succeed retiring **Homer W. Hanna, Jr,** as chairman of the West Virginia Public Service Commission.

Former Ohio Senator **George H. Bender** was sworn in recently as special assistant to Interior Secretary **Fred A. Seaton.**

Director of Connecticut Light & Power Co's newly formed data processing department is **George A. Ford.** He is succeeded as supervisor of machine accounting by **Cornelius J. Scollan.** In CL&P's industrial sales department, **Joseph F. Murphy** has been named coordinator of the electric and gas sales activities, Meriden district; **Emil Gross** transfers to the Bristol district as industrial sales engineer; **John Kroner** is new industrial sales engineer in Meriden; and **Samuel H. Lawson** becomes engineering sales assistant, New Britain district . . . **John S. Myers** is CL&P's new industrial sales engineer, Northern Division and **George E. Thomson** has been named commercial sales representative at Thompsonville.

W. D. Gill has been appointed new superintendent of B. C. Electric Co's 50 mainland substations. Named assistant superintendents in the distribution engineering department were **Allix J. Duncan** and **Herbert Sladen.**

Argonne National Laboratory has named **Dr. James R. Gilbreath** as assistant director . . . **Englehardt August Eckhardt** was recently designated assistant director of the National Science Foundation for the Division of Mathematical, Physical, and Engineering Sciences.

J. M. Stedman, former manager of Pennsylvania Power & Light Co's business development department, has joined Ebasco International as commercial sales consultant for training.

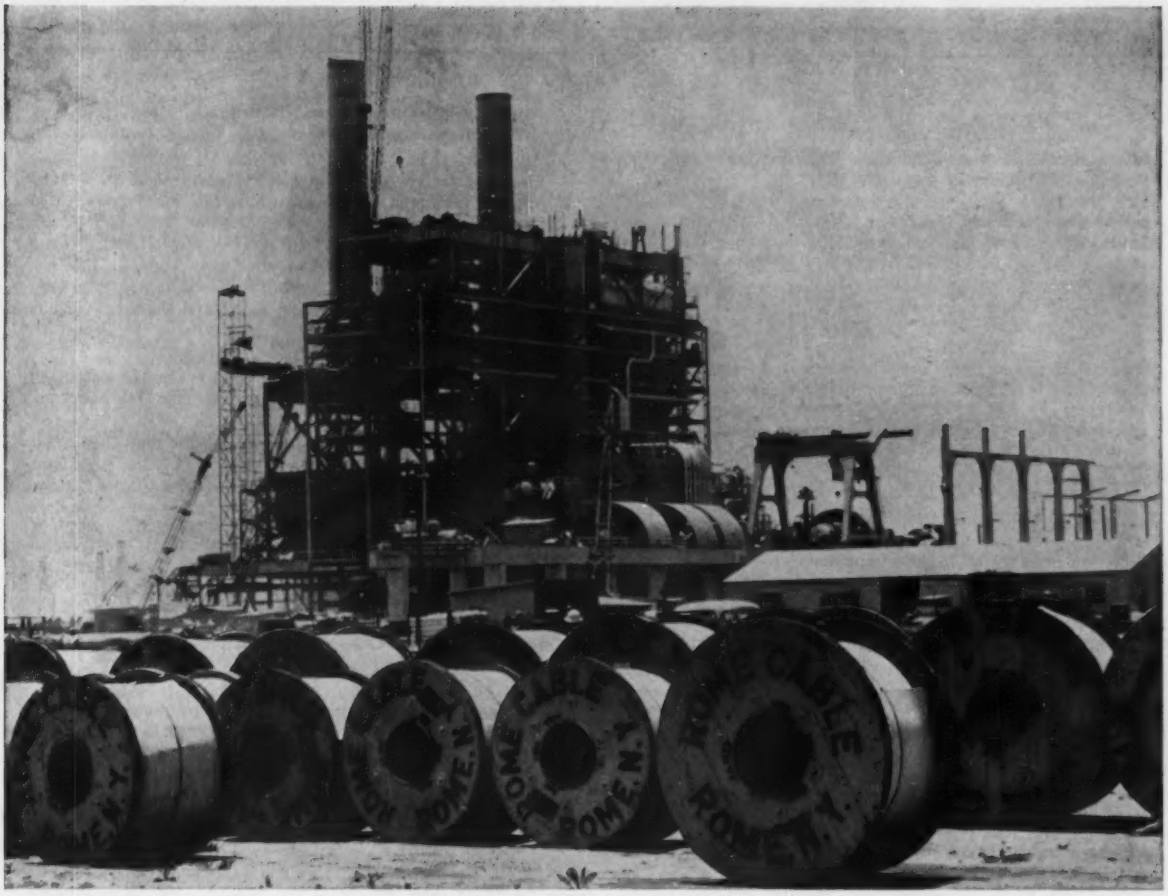
Stephen Wehner, chief hydraulic engineer of Pioneer Service & Engineering Co has relinquished routine department duties to become consulting hydraulic engineer. He is succeeded in his former post by **Wilbur R. Barrows.**

William W. Martenis has assumed new responsibilities as manager of the semi-conductor activities of Minneapolis-Honeywell Regulator Co. He will continue his duties as manager of new product extension.

Square D. Co's **Paul R. Shawver** has been designated manager of the Cedar Rapids, Iowa, manufacturing plant. He is former assistant to the vice president of the Distribution Equipment Division.

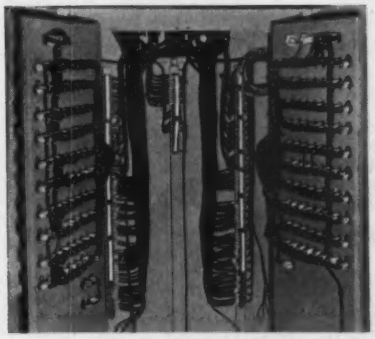
OBITUARY

Hudson R. Searing, 62, chairman of the board since 1955 and former president of Consolidated Edison Co of New York, Inc, died June 26 after a brief illness. Searing, who had served as president from 1949 to 1955 and as chief executive since 1953, had held numerous executive positions during his long career with the utility and predecessors.



Southern California Edison installed . . .

¼ million feet of Rome control cable in new Alamitos steam station



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MEETINGS CALENDAR

JULY

Edison Electric Institute—Industrial Relations Committee, EEI Headquarters, New York City, July 18.

Southeastern Electric Exchange—Personnel Administration Section Conference, John Marshall Hotel, Richmond, Va., July 25-26.

AUGUST

Western Electronic Show and Convention—Annual Meeting, Cow Palace, San Francisco, Calif., August 20-23.

American Institute of Electrical Engineers—Pacific General Meeting, Pasco, Washington, Aug. 26-30.

SEPTEMBER

American Institute of Electrical Engineers—2nd Special Technical Conference and Exhibit on Magnetic Amplifiers, Hotel Penn Sheraton, Pittsburgh, Pennsylvania, September 4-6; Sixth Annual Industrial Electronics Symposium, co-sponsored with Institute of Radio Engineers, Morrison Hotel, Chicago, Ill., Sept. 24-25.

Instrument Society of America—12th Annual Instrument Automation Conference and Exhibit, Cleveland Auditorium, Cleveland, Ohio, Sept. 9-13.

Illuminating Engineering Society—National Technical Conference, Biltmore Hotel, Atlanta, Ga., Sept. 9-13.

Maryland Utilities Association—33rd Annual Fall Conference, Cavalier Hotel, Virginia Beach, Va., Sept. 13-14.

Edison Electric Institute—Accounting Division Organization Meeting, jointly with AGA, Lemington Hotel, Minneapolis, Minn., Sept. 19-20; Industrial Relations 10th Annual Round Table Conference, Drake Hotel, Chicago, Ill., Sept. 23-25; Meter & Service Committee, Hotel Nicolet, Minneapolis, Sept. 23-25; Electrical Systems and Equipment Committee, Cosmopolitan Hotel, Denver, Colo., Sept. 30-Oct. 1.

Public Utilities Association of the Virginias—39th Annual Meeting, White Sulphur Springs, West Virginia, Sept 19-21.

American Society of Mechanical Engineers—Fall Meeting, Statler Hotel, Hartford, Conn., Sept. 23-25.

Electric Companies Advertising Program—Copy Group Meeting, Detroit, Mich., Sept. 25.

• **Electric Companies Public Information Program**—Steering Committee, New York City, Sept. 11; Workshop Conference, Whittier Hotel, Detroit, Mich., Sept. 25-27.

OCTOBER

Pennsylvania Electric Association—50th Annual Meeting, Bellevue-Stratford Hotel, Philadelphia, Pa., Oct. 2-3.

Indiana Electric Association—French Lick-Sheraton Hotel, French Lick, Ind., Oct. 2-4.

International Association of Electrical Leagues—Annual Conference, Sheraton-Gibson Hotel, Cincinnati, Ohio, October 2-5.

National Industrial Conference Board—Atomic Energy Course for Management, Hotel Moraine on the Lake, Highland Park, Ill., Oct. 6-12.

• **Iowa Utilities Association**—10th Annual Management Conference, Hotel Fort Des Moines, Des Moines, Iowa, Oct. 7-8.

American Society of Mechanical Engineers—Lubrication Conference, sponsored jointly with American Society of Lubrication Engineers, Royal York Hotel, Toronto, Canada, Oct. 7-9; Power Conference, Americus Hotel, Allentown, Pennsylvania, Oct. 21-23.

National Electronics Conference, Inc—Hotel Sherman, Chicago, Ill., Oct. 7-9.

American Institute of Electrical Engineers—Fall General Meeting, Morrison Hotel, Chicago, Illinois, October 7-11.

Edison Electric Institute—Area Development Workshop, Phoenix Hotel, Lexington, Ky., Oct. 9-11; Transmission & Distribution Committee, Statler Hotel, Boston, Massachusetts, October 17-18; Accounting Division Taxation Accounting Committee, held jointly with AGA, Williamsburg, Virginia, October 23-24.

Rocky Mountain Electric League—54th Annual Convention, Broadmoor Hotel, Colorado Springs, Colo., Oct. 13-17.

Interstate Power Club—Hotel Martinique, New York City, N. Y., October 14.

• **Oklahoma Utilities Association**—Electric Light and Power Division, Woodward, Okla., Oct. 25; Eastern District, Bartlesville, Okla., Oct. 25

Atomic Industrial Forum—Annual Conference, New York City, Oct. 28-30.

American Nuclear Society—Winter Meeting, New York City, Oct. 28-30.

National Association of Railroad Utilities Commissioners—Annual Conference, Peabody Hotel, Memphis, Tennessee, October 28-31.

Industrial Management Society—21st Anniversary Industrial and Management Clinic, Hotel Sherman, Chicago, Ill., Oct. 30-Nov. 1.

Institute of Radio Engineers—3rd Annual Technical Conference of the Professional Group on Electron Devices, Shoreham Hotel, Washington, D. C., Oct. 31-Nov. 1.

NOVEMBER

Edison Electric Institute—Accident Prevention Committee, Penn-Sheraton Hotel, Pittsburgh, Pa., Nov. 6-8.

Pacific Coast Electrical Association—Hawaiian Conference, Reef Hotel, Honolulu, Hawaii, Nov. 7-8.

Institute of Radio Engineers—Third Annual Instrumentation Conference, Atlanta Biltmore Hotel, Atlanta, Georgia, Nov. 11-13.

National Electrical Manufacturers Association—Traymore Hotel, Atlantic City, N. J., Nov. 11-15.

• **Electric Companies Public Information Program**—Inter-Regional Committee, Mayflower Hotel, Washington, D. C., Nov. 19.

• Additions this week.

SALES ASSIGNMENTS

COMPANY STAFFS

Bakelite Co, a division of Union Carbide Corp, has appointed Bruce R. Laumeister as a technical representative for the Extrusion Materials Division in the Philadelphia district office. He will cover Philadelphia; Camden, N. J.; Wilmington, Del.; Baltimore, Md.; Washington, D. C.

Cornell-Dubilier Electric Corp's Wayne L. Steinbarge has received a new appointment as special field representative.

Enjay Co, Inc, has assigned G. H. Lowden as engineering representative and manager of the new Detroit office. The company has also opened a new office in New Orleans.

Graybar Electric Co, Inc, has made the following appointments: A. G. Naylor is new regional appliance sales manager in the Youngstown and Erie areas, with offices in Youngstown; T. J. Bell replaces him as appliance sales manager for the Harrisburg, Pa., branch; L. T. Jamison becomes manager of appliance sales for the Erie, Pa., area; T. J. LeClair is named manager of Hotpoint major appliance sales in the San Francisco market; M. M. Owen rises to manager of appliance sales in the Oakland, Calif., branch; and L. V. Chase follows him as manager of appliance promotion in San Francisco. In addition, Austin Doyle has been appointed appliance sales manager at Wichita.

Line Material Industries has designated Andrew Genor lighting engineer in the Mountain States Division. With quarters in Spokane, Wash., the division covers Alaska, Washington, Oregon, Idaho, Utah, Colorado, Wyoming, western Nebraska, and most of Montana.

Joseph T. Ryerson & Son, Inc, has named as its new manager of sheet and strip sales at the Cincinnati steel service plant Frederick B. Winther, Jr.

Sylvania Electric Products, Inc, has named H. Page Woodbury as sales supervisor for lighting products in the New York section of the Metropolitan district.

Westinghouse Electric Corp's Lamp Division has advanced John H. Max to the position of Atlantic region sales manager. He succeeds Gordon W. Howson, now with the division headquarters sales staff in Bloomfield, N. J. . . . Willard C. Hird has been appointed to head the new north Los Angeles sales district of the Lamp Division, Raymond K. Leonard, former manager of the Los Angeles sales district, will manage the new south Los Angeles sales district. . . . Samuel J. Brechner has assumed his new post of general manager of Westinghouse Appliance Sales Co, wholly owned distributing subsidiary in New York City.

REPRESENTATIVES

Philco Corp's Government and Industrial Division has announced appointment of the following regional sales representatives: Sol J. Levy, Connecticut, New York, and central and western Pennsylvania; Carl A. Stone Associates, Inc, Arizona, California, and Nevada; Foster Electronics, Wisconsin and Michigan; Private Television Systems, Kentucky and Indiana; and Exec-U-Phone Systems, Inc, Maine, Massachusetts, New Hampshire Rhode Island, and Vermont.

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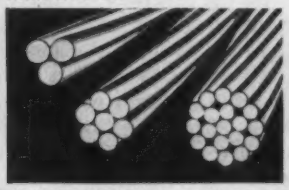

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Turbogenerator Cuts Costs

(*Continued from page* 79)

watthour meter. Cost of modification of the lubrication system was about $2,000.

No. 11 generator is operated as a synchronous condenser with the turbine coupled to the generator for two reasons:

1. During the loss of another Lake Shore turbogenerator, it is required to supply watts. The common header supplying No. 11 permits changing it from a synchronous condenser to a unit generating watts in a few minutes. This is done merely by opening the stop valve.

2. As shown on the accompanying one-line diagram, No. 11 generator does not tie into the switch house transfer bus, and thus there is no easy way to start it electrically.

Started with Steam

No. 11 turbine is started with steam and put on the line, after which the steam stop valve is closed. The usual high condenser vacuum is maintained by sealing the shaft with water and externally supplied steam, and by running the necessary condenser auxiliaries. The auxiliaries are steam driven and a portion of their exhaust steam is used for sealing the turbine. For these reasons it is not possible to operate this synchronous condenser independently of boilers. Lubricating oil is supplied by the shaft-driven pump.

An unusual operating problem arises when throttle steam is shut off with the generator on line. The generator then runs as a motor, and the turbine becomes a compressor. The low-pressure turbine stages, normally cooled by expanded steam, will be heated by windage losses. Windage loss is a function of wheel diameter, speed, and density of the steam and air mixture in which it is spinning. The greatest heating will occur in the low-pressure stages because of their relative size.

The only controllable factor is the density of the steam-air mixture. If it were possible to spin the rotor in a perfect vacuum, there would be no turbine heating problem. But in actual practice, even though a high condenser vacuum is maintained, it is necessary to spray cold water into the exhaust hood to cool the last stage of the turbine.

(*Continued on page* 135)

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Turbogenerator Cuts Costs

(*Continued from page* 134)

To detect changes in temperature around the last stage of the turbine, a stainless steel sheathed thermocouple was inserted through a hole in the casing to a point about ½ in. inside the casing, between the last stage diaphragm and wheel. A maximum temperature of 350F at this point is considered safe. The thermocouple is used as the primary element of a pyrometer alarm actuated when the temperature exceeds 250F. Total cost of this instrument was about $100.

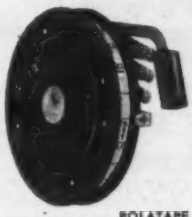
Losses in the entire turbogenerator amount to about 1,000 kw. Both generators are cooled with a spray-type air cooler using house service water.

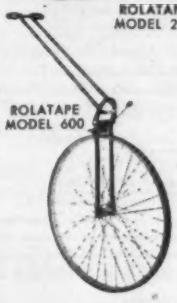
The plant which picked up the 10 Mw minimum load normally carried on the turbogenerators which are operated as synchronous condensers has a lower heat rate and lower fuel cost than Lake Shore "B" plant. There is a gross fuel saving of $50 per hr between operating a Lake Shore "B" turbogenerator at 10 Mw and not operating it at all.

No. 10 synchronous condenser is operated at a cost of $2.50 per hr for power to run the generator and oil pumps; a net saving of $47.50 per hr. No. 11 synchronous condenser, with the generator coupled to the turbine, is operated at a cost of $18 per hr for power to the generator and steam to the turbine-driven auxiliaries. This saves $32 per hr over conventional operation. It was estimated that the No. 10 synchronous condenser would be operated 7 hr per day, 5 days per wk, throughout the year. The No. 11 synchronous condenser would be needed 7 hr per weekday during the air conditioning season, June through September. A saving in fuel of about $104,000 is anticipated this year.

Dayton P&L Buying Site

Dayton Power & Light Co is buying about 1,000 acres in Adams county along the Ohio River for the site of its third electric generating station K. C. Long, president, announced. Cost of the generating station was estimated at "over $100 million."





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It will help to keep our readers interested in this advertising if you will acknowledge every application received, even if you merely return the letters of unsuccessful applicants with, "Position filled, thank you" written or stamped on them. If you don't care to reveal your identity, mail them in plain envelopes.

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Classified Advertising Division

McGraw-Hill Publishing Co., Inc.

 (Continued from page 67)

Hoot Lake plant at Fergus Falls, Minn. The bulldozer symbolized modern equipment and methods to be part of the 53.5-Mw unit . . . **Potomac Electric Power Co** says it intends going ahead with its 175-Mw, $35-million Dickerson, Md., station. Project had been delayed by Congressional hassle between Maryland and Virginia representatives over which state was to get the plant.

Long Island Lighting Co's Edward F. Barrett station is in service now. It has 185-Mw capacity but can accommodate five more 185-Mw units . . . **TVA** has bought Camp Chicagami near Chattanooga as a potential steam plant site that may fit in with the Authority's long-term plans . . . **Cleveland Electric Illuminating** Co has started work on a 240-Mw turbo-generator addition to its Ashtabula plant.

Wisconsin Public Service Corp will spend $6.3 million on a 75-Mw addition to its Pulliam steam plant.

HYDRO

Corps of Engineers' generators at The Dalles, Ore., began feeding power into Bonneville Power Administration's grid in May, although first main turbine will not go on line until November. This power is from the first of two 13.5-Mw "fish unit" turbine generators . . . It appears likely that another year of power production below firm energy output figure will occur at **Hoover Dam.** Object: To build up storage after four years of low inflow to reservoirs.

THIS IS ONE of two "fishwater" units now running at The Dalles in Oregon

Canada's hydroelectric capacity will jump 47.6% (221 million kw) over the 1956 capacity by 1960, forecasts the Bureau of Statistics . . . Federal Power Commission has issued three preliminary permits for hydroplants: One on Copper River in Alaska for **Central Alaska Power Assn, Inc.,** and two for Plumas County Calif. for **National Youth Foundation** of Taylorsville, Calif.

Snohomish County PUD of Everett, Wash., may soon apply for a license to build three dams on Sultan River east of Everett which would produce a maximum of 135 Mw. Cost: About $41 million.

TRANSMISSION

Utah Power & Light Co and **Telluride Power Co** are considering a 230-kv, 70-mi line linking UP&L's system at Nephi with the Richfield area as a first step in bringing Glen Canyon hydroelectric power from Arizona. **Southern Utah Power Co** is considering a 138-kv, 120-mi line from Cedar City which would connect with the UP&L-Telluride project at Richfield.

The first part of a 115-kv transmission line that will encircle Albuquerque has been energized by **Public Service Co of N. M.** This is the first 115-kv on the utility's system.

Niagara Mohawk Power Corp plans a 230-kv, 21-mi line from Huntley steam plant to Gardensville station to "reinforce the power backbone of the Niagara frontier." NMP also plans a 55-mi, 230-kv line to link its system with the St. Lawrence power project.

DISTRIBUTION

Illinois Power Co has energized its new substation in northwest Champaign. It feeds a $7.5-million edible-oil plant and a large area of northwest Champaign. Earlier this year, the utility placed in service a new sub in southwest Champaign which steps down incoming power from 69 to 12 kv.

FPC Reports 487.7 Mw Net Capacity Gain

PLANT ADDITIONS DURING MARCH

State	Utility	Plant	Fuel	Capacity
Colo.	Moon Lake Electric Assn, Inc.	Rangely D	IC	2,700
Fla.	U. S. Army Engineers	J. Woodruff	H	10,000
Ky.	Kentucky Utilities Co	E. W. Brown	S	100,000
La.	New Orleans Public Service, Inc.	Michoud	S	115,200
Mich.	Marquette Dept of Light & Power	Marquette 4	IC	3,640
Neb.	Omaha Public Power District	North Omaha	S	100,000
N. Y.	Rochester Gas & Electric Corp.	Rochester 7	S	60,000
Tenn.	U. S. Army Engineers	Old Hickory	H	25,000
Tex.	Robstown Lighting & Lighting & Power Dept.	Robstown	IC	1,000
Wash.	U. S. Army Engineers	Chief Joseph	H	64,000
	RETIREMENTS			
Ind.	New Harmony Electric Light Plant	New Harmony	IC	525
Mass.	Haverhill Electric Co	Haverhill	S	600
N. C.	Rocky River Power & Light Co	Sanford	H	168
N. Y.	Rochester Gas & Electric Corp.	Rochester 3	S	25,000
N. Y.	Rochester Gas & Electric Corp.	Sodus Center	H	250

U. S.	Hydro	Steam	IC	Total
Added	99,000	375,200	7,340	481,540
Retired	418	25,600	525	26,543
Adjustments Plus	4,350	27,500	1,271	33,121
Adjustments Minus	75	.....	345	420
Net Change	102,857	377,100	7,741	487,698

H—Hydro, S—Steam, IC—Internal Combustion

United States Capacity as of April 1—Hydro, 26,206,059 kw; Steam, 93,623,747 kw; IC, 2,441,019 kw; Total, 122,270,825 kw.

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When busy engineers and executives in the dynamic electric power industry get around to naming the one magazine they find most useful in their work, it's ELECTRICAL WORLD, by a margin of 4 to 1. Year after year, survey after survey, WORLD earns *at least* four times as many votes as any other magazine in the field.

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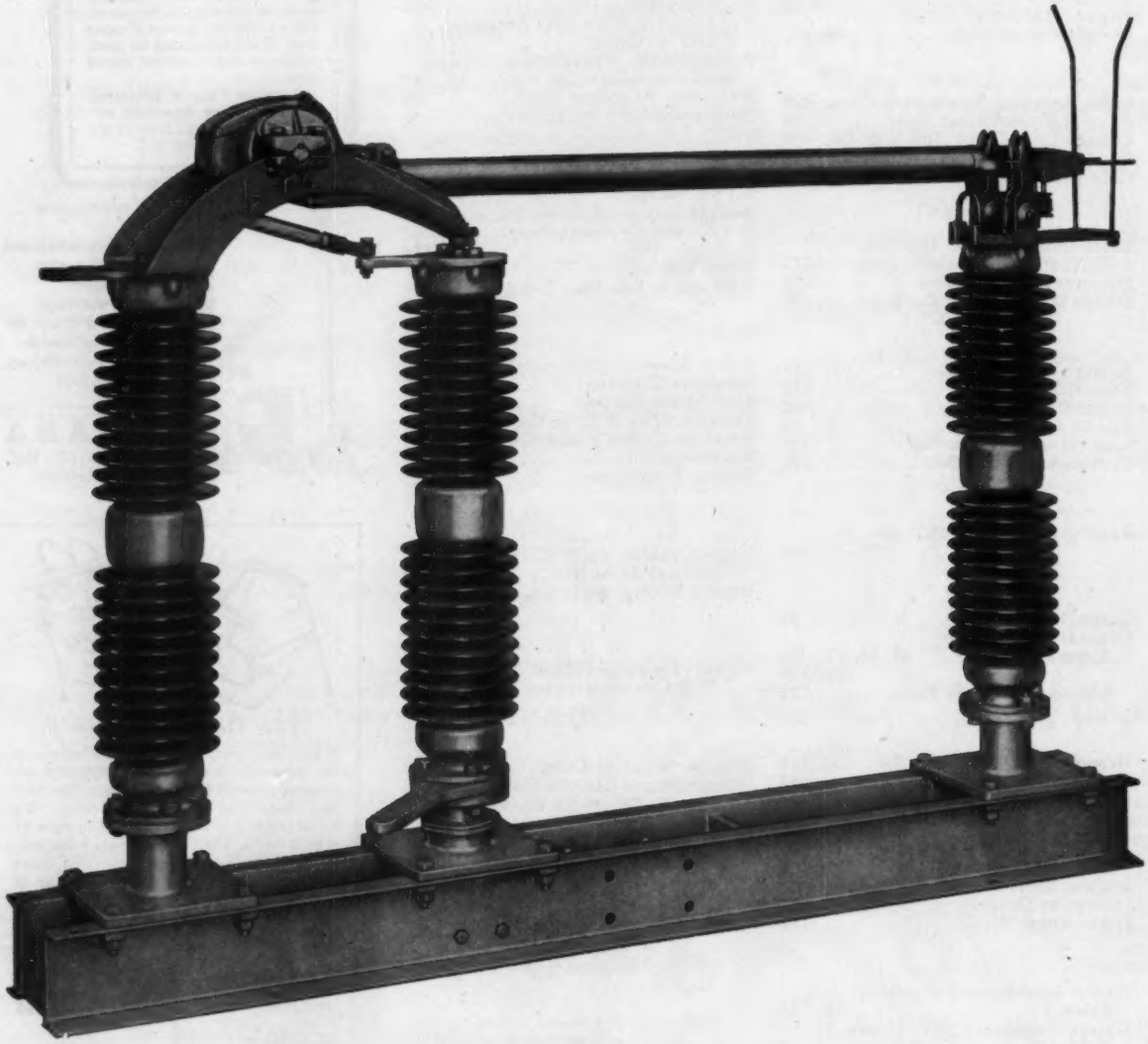

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69,000 Volts—1200 Amperes
Type 0-2
Vertical Break, Three Pole, Single Throw
Group Operated—One Pole Shown
HIGH PRESSURE SILVER TO SILVER CONTACTS
See Bulletin 46-A

Federal Pacific BUS DUCT Powers Sensitive Overseas Cable and Radio Circuits...

where service continuity counts most!

Assistant Chief Engineer, Mr. Howard Hoffmann, pointing to connection between 3000A switch and 3000A Aluminum bus duct.

INSTALLATION HIGHLIGHTS

View of reducer shows cable tap box on 3000A bus, then reduction joint and 1000A bus continuation.

Where horizontal run turns upward to vertical riser. Note cable tap box, offset and elbow.

Close-up of bus tie between service switch and bus duct.

Special offset between two elbows is factory-fabricated single piece.

Even the briefest power interruption at American Cable and Radio is enough to throw all of its high-speed multiplex cable and radio teleprinter circuits out of synchronization. Once this happens—every station and every repeater station of every cable or radio circuit must be painstakingly resynchronized. A 24 hour job during which all cable and radio traffic stops cold!

Obviously, company officials were in no mood to gamble with the bus duct needed to power these circuits. Continuity of service was absolutely essential. That's why they specified Federal Pacific *3000A Aluminum Bus* Duct.

After installation, the Assistant Chief Engineer personally checked every single bolted joint along the entire 250 foot duct with a Ducter Ohmmeter. Results? Resistance averaged no more than 3 to 5 micro-ohms... less than that of solid bus bars!

Results like these are typical of Federal Pacific Bus Duct installations. Whatever your particular bus duct requirements may be, you'll find it pays to check Federal Pacific first.

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KUHLMAN "Salesman of the Week"

If you can identify this Kuhlman representative, and are the first one to notify Dept. SA-1, Kuhlman Electric Co., Bay City, Mich., you will receive a valuable gift.

"Meet the people who make Kuhlman transformers"

"The gentleman at the extreme right is John Franklin, our Bay City factory superintendent. John's been building transformers nearly all his life. He has been with the company more than 40 years.

"Next to John is Cliff Lefler, President of our "Quarter Century" Club. Cliff tells me that the club's membership now represents more than 7% of our employment.

"In fact, 50% of our people have been with the company more than 10 years—over 25% more than 15 years!

"Low labor turn-over . . . years of on-the-job experience . . . quality craftsmanship have been our "way of life" since 1894. You'll find us the kind of company you'll enjoy doing business with. Ask anyone of our thousands of satisfied customers."

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